

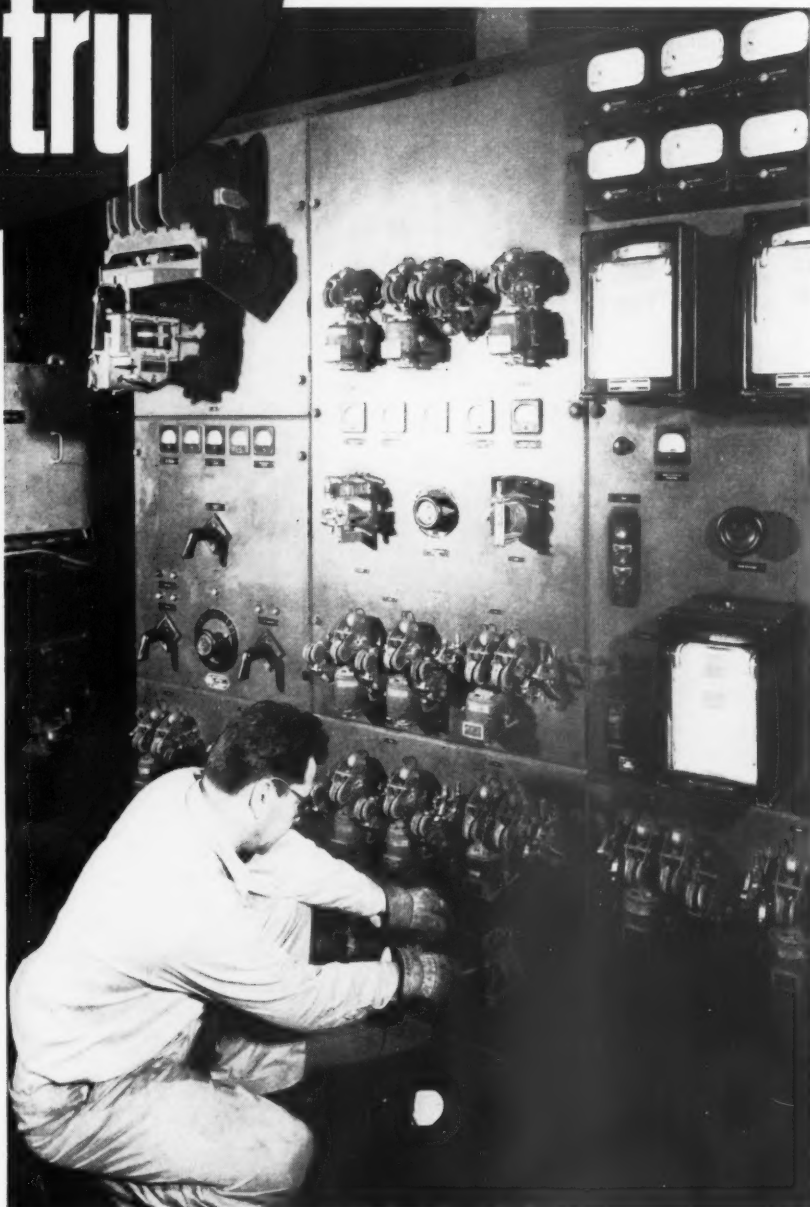
Western Industry

November 1955

ELECTRICAL MAINTENANCE

Failure of any electrical motor or control could be a costly production - stopper at Bethlehem Pacific's Los Angeles plant. That's why plant engineers there work so hard toward failure-proof electrical upkeep (see page 39.) At right, adjustment of over-voltage relay on motor control panel at the plant is checked.

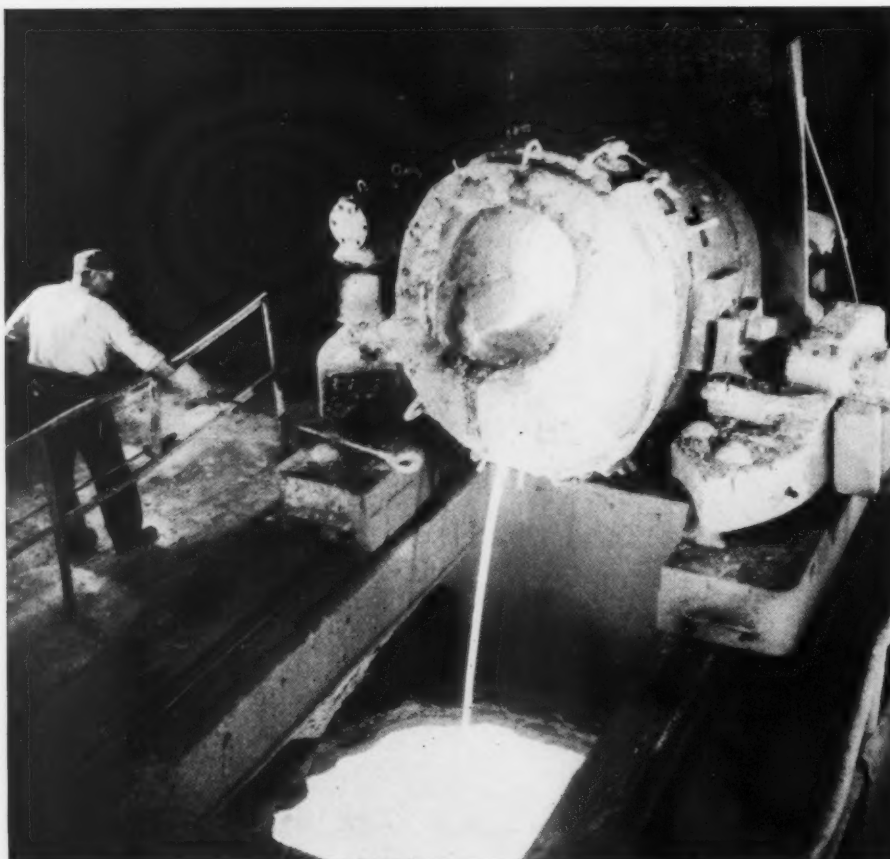
High speed, automatic, and continuous processing requires smart electrical maintenance. How it's done at a new Western brewery is told on page 55.



MATERIALS HANDLING New approach cuts lift truck operating costs 30% . . . p. 50.
Unique "screw" conveyor lifts hot uranium ore . . . p. 45. Automatic belt and roller system . . . p. 42.

WATER PROBLEMS Controlling steam plant corrosion . . . p. 48. In-plant cooling towers save water, and \$\$. . . p. 44.

PLANT HOUSEKEEPING How to burn your waste . . . p. 60. How one plant proved cleanliness really pays off . . . p. 57.



**This exclusive 5-minute operation
gives **WROUGHT IRON** built-in
protection against corrosion**

The pig iron has been melted in the cupolas . . . purified by the bessemer converter. An exact iron silicate has been readied in special rotary furnaces and moved by ladle beneath the machine holding the highly refined, molten iron . . . everything is ready for the key step.

The signal is given. The processing machine tips its ladle forward. Molten refined iron flows at a controlled, predetermined rate into the ladle holding the melted silicate. This operation is shown above. The falling iron stream penetrates into

the silicate, then separates into droplets. Liberated gas from within bursts apart the solidifying droplets. The shattered fragments settle continuously to form a "spongy mass"—welding hot—in the molten silicate.

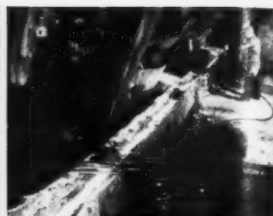
This "sponge," weighing three tons or more, is pressed into a rectangular block called a "bloom." Giant rolling mills give final form to the useful material—WROUGHT IRON.

Because the thousands of fibers of silicate gathered in the mixing operation and distributed through the

body of high-purity iron are unaffected by corrosion, they establish a "defense in depth" against corrosive attack. This is why wrought iron stays on the job longer, at lower cost per year.

Our booklet, *The ABC's of Wrought Iron*, tells more of this story. Send for your copy.

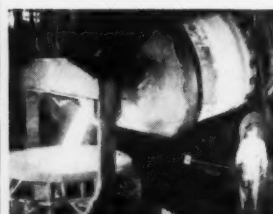
A. M. Byers Company, Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. International Division: New York, N. Y. Available in Canada and throughout the world.



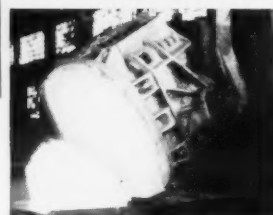
Melting pig iron in the cupolas



Purifying iron in bessemer



An exact iron silicate is tapped

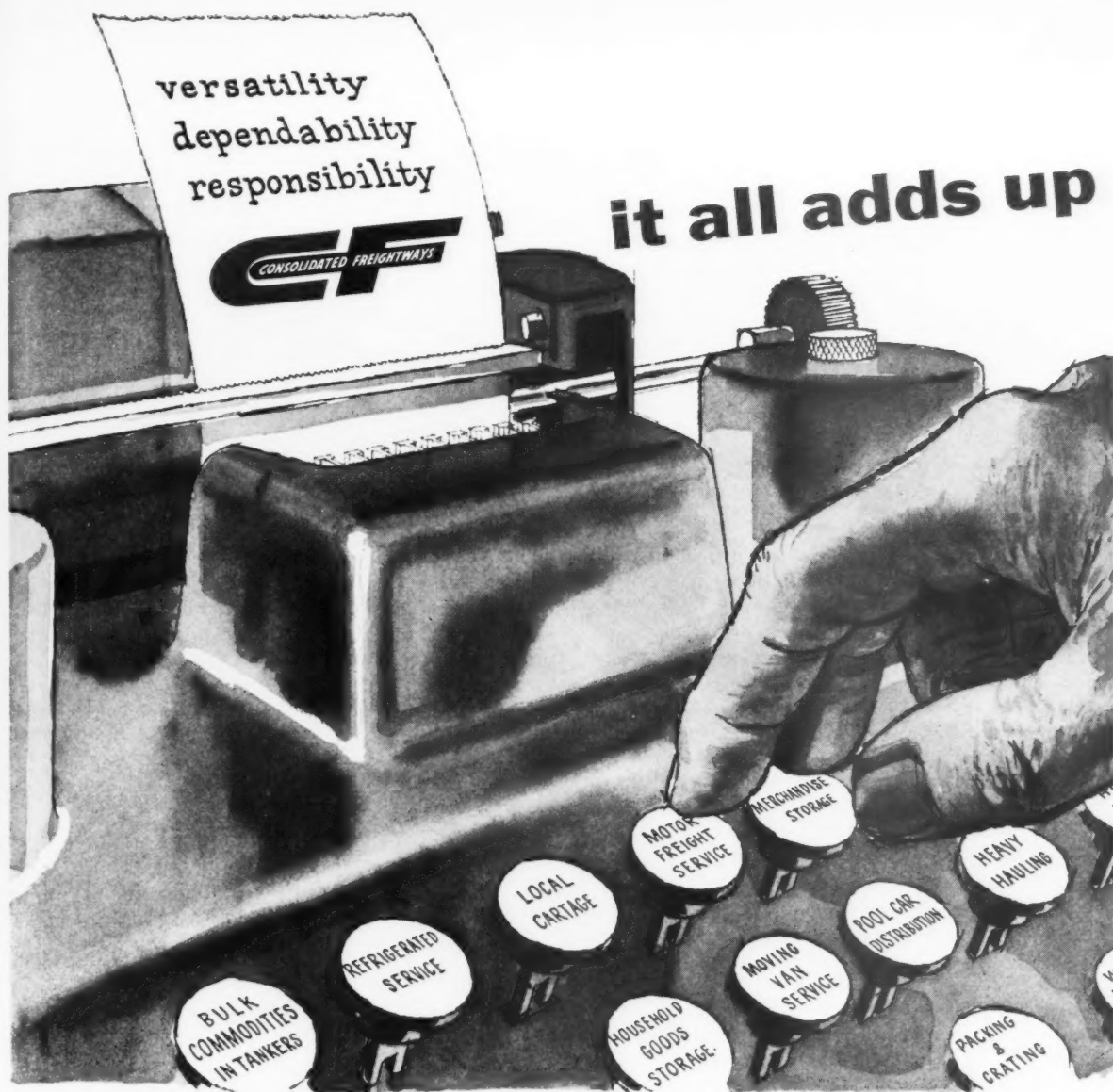


"Sponge ball" goes to the press

BYERS

CORROSION COSTS YOU MORE THAN WROUGHT IRON
WROUGHT IRON
TUBULAR AND HOT ROLLED PRODUCTS
ELECTRIC FURNACE QUALITY STEEL PRODUCTS

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Consolidated Freightways is always the right answer to your motor transportation and distribution requirements. To each of the many services it provides, add the responsiveness of advanced, versatile equipment...modern terminals and warehouses...dependable performance...and a genuine desire to serve, *and serve well*.

If you are not already enjoying the benefits of a carrier that is a complete distribution service, let CF go to work for you. We're as near as your telephone.



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Terminals in 49 other key cities from the Pacific Coast to the Great Lakes...Thru service to all major eastern cities
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November 1955

Vol. XX, No. 11

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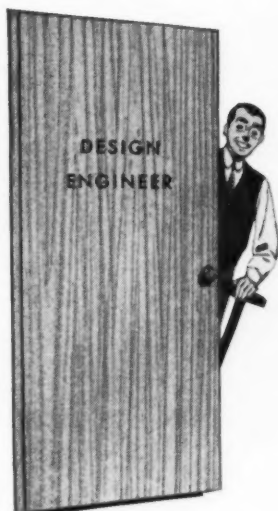
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... Specified by men with responsibility



OSTUCO Welded Tubing offers design engineers unlimited latitude to create a variety of original but practical product designs.



Sales Managers can meet ... and beat the competition with products incorporating OSTUCO Welded Tubing.



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—Fabricating and Forging

OHIO SEAMLESS TUBE DIVISION

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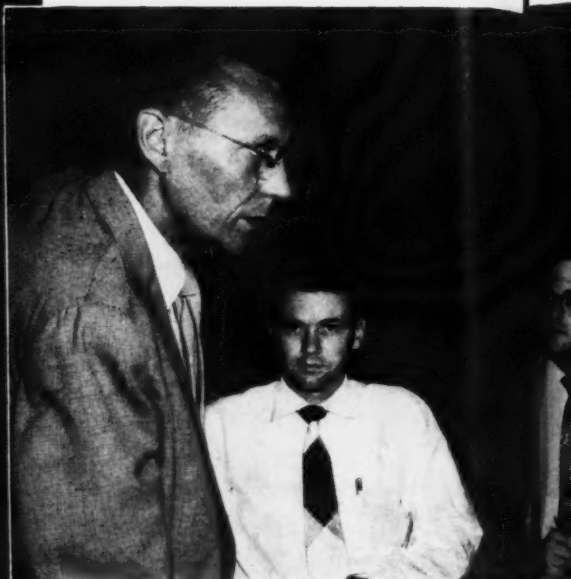
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117 Liberty Street, New York 6, New York

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3 CUSTOMERS STATE . . .

Space, Safety

Placed on the market in July of this year, General Electric's all-new Limitamp Control has received enthusiastic acceptance throughout industry.

1. NEW MOUNTING ARRANGEMENTS. Almost immediately, L. L. Hamig, of Ferris & Hamig, Consulting Engineers, found the exclusive front-connected feature of the new control solved a tough application problem. There is no need for a back aisle with the new equipment, so units may be mounted back-to-back, back-to-wall, or as free standing enclosures yielding great space savings.

2. 50% SMALLER. In another case, H. A. Weigand, of Ingersoll Rand Company specified this new fused starter in a compressor station for the Laclede Gas Company of St. Louis, Missouri. Mr. Weigand stated the new control's 50% floor space saving feature simpli-

◀ 50% smaller than previous models, all-new G-E Limitamp Control offers a gang-operated disconnect switch as standard equipment. See opposite page for space savings comparisons.



"The all front-connected feature of G.E.'s Limitamp Control gave me the versatile floor arrangement I needed to solve a tough application problem," said Mr. L. L. Hamig (extreme left) of Ferris & Hamig, Consulting Engineers, St. Louis, Mo. Seated are R. E. Watts of Ferris & Hamig and P. L. Korklan, General Electric Co. Sales Engineer.

"The space savings offered by G.E.'s Limitamp Control helped simplify the installation of a compressor station for the Laclede Gas Co. of St. Louis," according to H. A. Weigand of Ingersoll Rand Company. The compressor station is located in a residential area and conforms to local building codes. This put space requirements at a premium and posed a real installation problem.



Problems Solved by New G-E Limitamp* Control

fied installation where space considerations were a primary factor.

3. ADDED SAFETY. One of the nation's largest automobile manufacturers ordered eight of the starters and within days increased the order to 17. The gang-operated disconnect switch and co-ordination features which afford greater protection of the starter, the controlled equipment, and personnel were exactly what they wanted.

The 30" depth of the new Limitamp Control, which allows the unit to be transported through normal size doorways, has also received industry-wide approval. The unit's 90" height includes bus compartment which is surrounded by steel barriers within the enclosure.

Other features which save time and money on installation and maintenance are the low-voltage panel, hinged to swing out of the

*Trade-mark of General Electric Co.

cabinet, and the contactor which may be easily rolled in or out of the enclosure. This provides ample room for a worker to enter the enclosure while making installation connections.

This all-new Limitamp Control is ideal for high-voltage motors, rated 2300-4800 volts, up to 3000 hp, and may be applied to squirrel-cage, synchronous, wound-rotor, and multi-speed motors on power systems requiring high interrupting capacity for maximum short-circuit protection.

Specify the all-new Limitamp Control through your nearest G-E Apparatus Sales Office. G-E engineers will help apply this new control to your operation. For more information write for Bulletins GEA-6331, GED-2446, to Section 781-14, General Electric Company, Oakland, California.



Progress Is Our Most Important Product

GENERAL  ELECTRIC

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FOR EXTRA TOUGH SERVICE



CATERPILLAR USES ATLAS ...for long service...low maintenance

Where extra toughness is needed in roller chain the leaders choose Atlas Roller Chain and Sprockets. Precision-made from specially selected steels, Atlas offers longer life in every link. Pins and bushings are "Ni-carb" hardened... each link plate and roller is precision-toughened by an exclusive Atlas heat treating process. Built-in stamina provides extra strength to take the heaviest loads—whether uniform, uneven or severe shock.

From tough "cat-drives" to tiny timers... from fractional horsepower motors to mighty giants Atlas offers you a wide selection of roller chain and sprockets. Singles or multiples... regular or heavy-duty... standard or extended pitch... steel, stainless-steel or bronze, you'll find extra service in rugged Atlas Roller Chain and Atlas Precision-Matched Sprockets.

See Your Local Distributor for Quick Deliveries... Service

ATLAS CHAIN & MANUFACTURING CO.

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ATLAS

ROLLER CHAIN AND SPROCKETS

JERVIS B. WEBB

CONVEYOR ENGINEERING, MANUFACTURE, INSTALLATION and AUTOMATION



Webb Trolley Conveyors automatically transport parts and sub-assemblies to final assembly line.

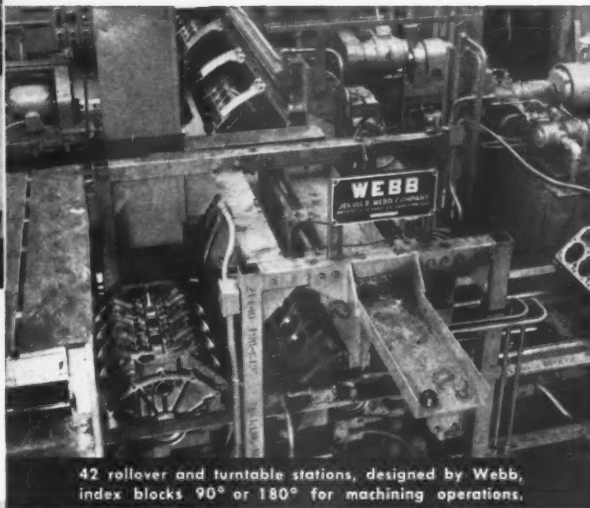
Automation at Plymouth



Four miles of Webb Trolley type overhead transport conveyors have given the new Plymouth engine plant a higher degree of efficiency than they have ever had before. In engineering the layout for the new plant, Plymouth's goal was to achieve flexible and continuous production flow with a minimum of manual handling. Webb custom-engineered conveyor systems... 26 conveyor lines... have provided the answers for Plymouth.

Of particular interest is the high degree of automation designed by Webb engineers into the engine block production line. A Webb two-strand indexing type chain conveyor provides positive flow control for engine block production. Also, Webb engineers designed twenty rollover stations where engine blocks

MATERIALS HANDLING...



42 rollover and turntable stations, designed by Webb, index blocks 90° or 180° for machining operations.

are automatically rotated 90° or 180° on the vertical axis to put them into position for the next machining operation. In addition, twenty-two Webb designed turntables index the blocks 90° on the horizontal axis for another machining operation.

Complicated automatic control systems and the control panels were designed and built by Control Engineering Co., a subsidiary of Jervis B. Webb Co. These control panels furnish a visual check on material flow and the operation of the conveyor systems.

This installation is another example of how manufacturers are turning to Webb conveyor engineers for answers to their materials handling problems. Regardless of your needs—single line conveyor or a complete plant conveyor system—Webb engineering service will provide the economical and efficient answer to your materials handling requirements.

Write to us on your company letterhead and we will be happy to place your name on the Webb mailing list to receive factual technical information on conveyor installations, case history reports, and new product literature.

JERVIS B. WEBB CO. of CALIFORNIA

9301 RAYO AVENUE

SOUTH GATE, CALIFORNIA

Specialists in Custom Conveyor Systems

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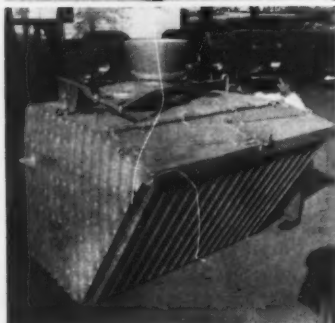
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Briefly, this ad illustrates why DEMPSTER-DUMPSTER SYSTEM

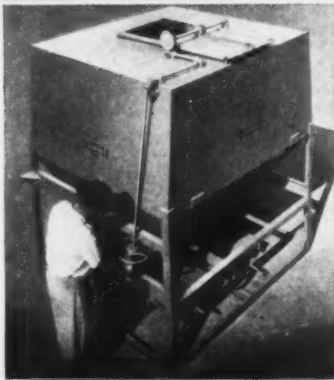
Container at right has cast iron bottom and inside walls are lined with fire brick. It handles hot skim off aluminum.



This Tilt Type Container was the result of a cost-cutting idea whereby a high temperature dusty product would be handled by a plant's Dempster-Dumpster. Container has cooling fins, counter-balanced hinged lid with 3-way locking device, 16" sliding gate valve and two sight-glass inspection openings.



Here is a Hopper Type Container with a top door for filling and two bottom discharge doors operated by rack and pinion. Another case where the Dempster-Dumpster System was applied to an additional problem to further reduce costs.



Container at right is just one of several different types we have designed to handle equipment, materials, packages, parcels, etc.



IN A NORMAL INSTALLATION the Dempster-Dumpster System is purchased by a plant because of its proved record for handling bulk materials at tremendous savings. This normal installation usually includes one truck mounted Dempster-Dumpster and any number of standard containers designed to meet the various requirements within the plant. In some cases, containers number 40 to 50. These containers can range in capacity up to 21 cu. yds., with all containers served by the one Dempster-Dumpster.

In the great majority of cases this basic installation is just a starter. Management men, constantly looking for lower operating costs, find numerous and amazing extra savings in the Dempster-Dumpster System. Once in service, transporting developments of every description come to light that supplement the original functions of the equipment. Your own men find easier, quicker and additional cost saving ideas for its use. Many even overshadow the original savings and the equipment becomes more and more indispensable.

Look over just a few of the "Special" containers illustrated in this ad. They are all the result of rough ideas that originated with the men in plants after a basic installation, then developed by our engineers. All ideas were stimulated by the powerful Dempster-Dumpster and its flexibility in picking up, hauling, setting down or dumping anything that needs transporting, at lower cost.

One man, the driver, and a few simple hydraulic controls in the cab of a Dempster-Dumpster, will become indispensable in your plant. It is just that in hundreds of plants of every description throughout the nation. Let one of our representatives give you details of installations. Manufactured exclusively by Dempster Brothers, Inc.



Above container is built with cast iron liner. The holes in outer wall are for cooling.

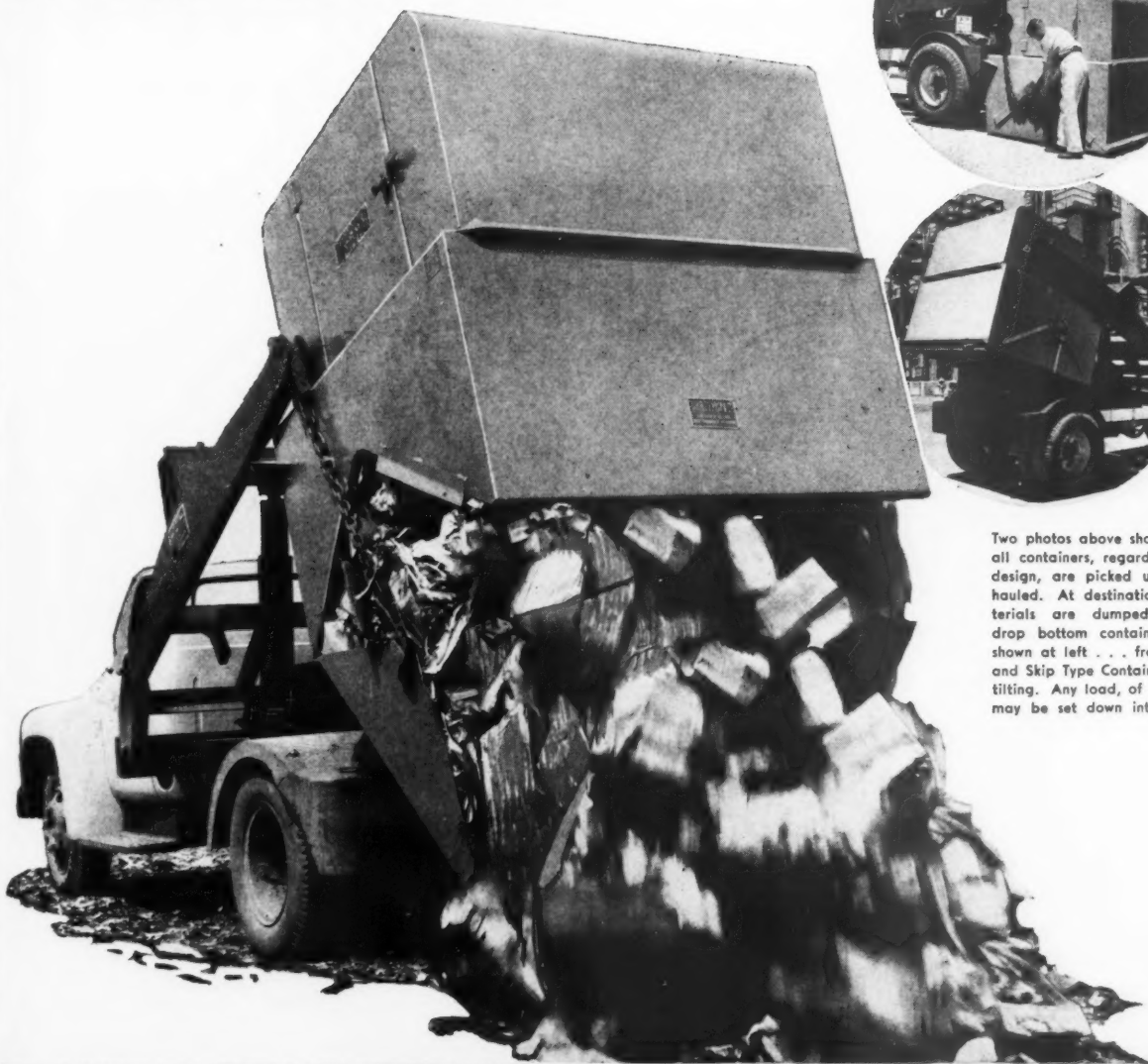
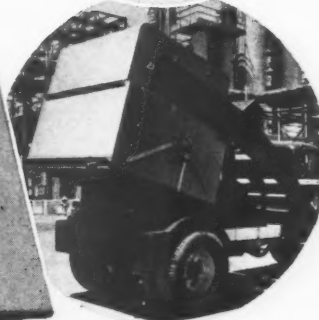


Here is one of several special drop bottom type containers equipped with couplers and ball bearing trucks for operation in train on rails.



DEMPSTER BROTHERS

so many plants find the indispensable...



Two photos above show how all containers, regardless of design, are picked up and hauled. At destination materials are dumped from drop bottom containers as shown at left . . . from Tilt and Skip Type Containers by tilting. Any load, of course, may be set down intact.



This is a special adaptation whereby waste zinc slurry is pumped into two containers, which serve as settling tanks, enabling majority of the water to be decanted before sludge is transported and dumped at waste basin.



Tank Type Containers are available with or without casters in steel, aluminum, stainless steel, etc. Capacity ranges up to 1,200 gal. They may be lined with rubber, lead, highly resistance coatings, etc.



This is a master container with three 2 cu. yd. insert containers. Each insert container is provided with casters, counter-balanced spring-hinged lid for loading and dumping.

5115 N. Knox, Knoxville 17, Tennessee

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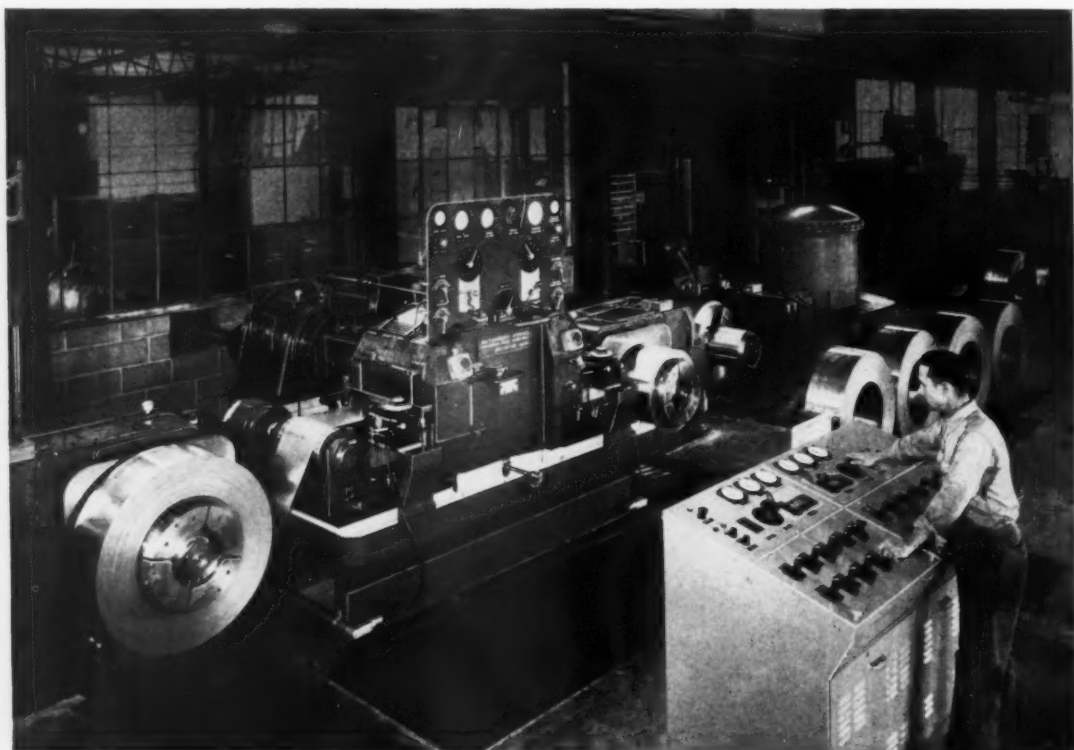
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ROLLS STRIP TO



REALLY CLOSE TOLERANCES!



Calstrip's New Sendzimir Mill — the only mill of its type in the West

* YOU NAME THE TOLERANCE — WE'LL ROLL IT!

Holding ultra-close thickness tolerances is a skill Calstrip is proud to offer customers. Long experience has proven that the ultimate in control of thickness variations is best achieved by cold reducing strip coils in narrow widths. That is why we roll coils 10 inches to 13 inches wide on our new Sendzimir Mill.

There are other advantages too — Manufacturers who have solved production problems by specifying Calstrip close tolerance, low carbon strip, discover that our strip steel also has these

superior qualities:

- Thickness is uniform edge to edge
- Strip is extremely flat
- Hardness and mechanical properties are precisely controlled
- Finish is fine grained, smooth and bright
- Width variations are well within standard limits

Order Calstrip Steel for high speed production of parts which are stamped, drawn, or formed. Your plant will produce more parts per ton of steel with fewer rejects — your products will function better and look better.

Let our sales engineers know about your requirements for low carbon, spring and alloy steel strip, as well as aluminum coil stock.

Calstrip®

STEEL CORPORATION • MILL AND OFFICES

"THE WEST'S FIRST COLD ROLLED STRIP MILL"

7140 BANDINI BOULEVARD • LOS ANGELES 22, CALIFORNIA • TELEPHONE RAYmond 3-1344

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WESTERN INDUSTRY — November 1955

Nothing Like It For "Big Grinder" Features At Low Cost!

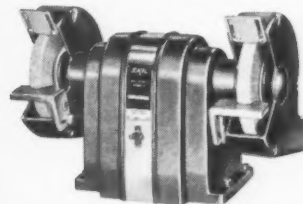
SKIL 6" Model 246 Bench Grinder

FOR GRINDING, SHARPENING, BRUSHING OR BUFFING...

IN ALL PRODUCTION AND MAINTENANCE!



Ordinarily you find features like these only on larger, more expensive bench grinders! There's *extra safety* in SKIL's wheel guards with end covers, spark arrestors and exhaust chutes, and sturdy adjustable tool rests. Flat face design permits easier handling of work, lets you reach hard-to-get-at surfaces. For all grinding, sharpening, brushing and buffing jobs in the smaller shop. Also ideal for spotting around larger plants to eliminate bottlenecks, save man-hours. Ask your distributor for free demonstration and free trial!



Model 246, 1/4 h.p.—Only \$58.00
Model 247, 1/3 h.p.—Only \$68.00

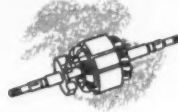
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Bench Grinders
Are the Finest
You Can Buy!**



More safety features
— exclusive with SKIL
at these low prices!



Self-lubricating ball
bearings for continu-
ous top performance!



Fast-starting, quiet,
statically and dynam-
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Pedestal base and
eye shields...optional
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☐ Please send literature on SKIL Models 246 and 247 Bench Grinders.

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Company

Street

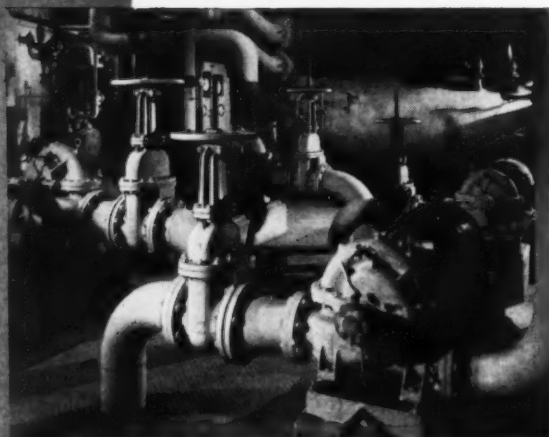
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**The Mid-America
Home Office Building of
The Prudential Insurance Co.
of America**



A small section of the *Prudential's* expansive, multiple piping installation for year-round air conditioning. Pipelines are equipped with Crane valves and fittings.



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General Contractor.....G. A. FULLER CO.
Heating.....H. F. REGER CO.
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Temperature Control*.....W. A. POPE CO.
*Plumbing, Sprinkler and
Fire Protection*.....M. J. CORBOY

Chicago's newest... tallest... controls its weather with Crane valves

Its roof-top at 601 feet gives the title of Chicago's tallest to this 41-story steel-granite-limestone-aluminum edifice on the Loop's lake front. A TV antenna reaches 324 feet above the roof to a new peak in the city's skyline.

An achievement in architecture and "air-rights" construction, the *Prudential* makes many innovations for efficient office layout, personal comfort of occupants, and thrifty building operation.

Year-round air conditioning is provided by three methods, using the same installations—distribution units and piping—for both heating and cooling.

Other features include a central circulating filtered and refrigerated drinking water system. Liquid soap is piped from remote tanks direct to lavatories.

Crane valves and fittings play a big part in keeping the *Prudential's* piping services at peak efficiency. At the con-

trol points of heating and cooling fluids, Crane valves assure added safety and durable, cost-saving performance.

A century of quality manufacturing and sound values has made Crane equipment the first choice of thrifty buyers of valves and fittings in every industry. There's no better protection for big or small investments in piping.

Crane Co., General Offices: Chicago 5. Branches and Wholesalers in all areas.

CRANE CO.

**VALVES • FITTINGS • PIPE
KITCHENS • PLUMBING • HEATING**

CRANE'S FIRST CENTURY...1855-1955

... for more details, circle No. 10 on Reader Service Postcard
WESTERN INDUSTRY — November 1955



an **AMFORGE** *analysis*
saved 40,000 pounds of steel
for a customer



And the savings were found in the AmForge Upset Method of forging.

On an order for 25,000 of these gear blanks (half section shown above), AmForge saved 20 tons of steel, high freight costs and heavy machining expenses compared to the former method of forging which had resulted in a solid hub as well as no reduction in diameter between the collar and the gear proper.

How? AmForge analyzed the problem from the same blueprint and specifications that had been used for the old method, but AmForge showed the customer that this piece could be adapted to its modern upset method.

When the forging was delivered to the customer, not only did he gain these tremendous savings but he got a better forging as well. It showed a denser structure and greater resistance to distortion in heat-treating operations due to a radially upset grain. This also gave all gear teeth a uniform, maximum strength.

This is just another example of how AmForge has been able to find savings for its customers through an AmForge Analysis. With its modern upset and press forging facilities at Azusa, California, AmForge offers its forging "know-how" plus the added advantage of lower freight costs to West-Coast manufacturers.

Satisfy yourself as to whether you can save with AmForge by sending in a blueprint, sketch or sample for an AmForge Analysis—no obligation, of course.

AMERICAN
Brake Shoe
 COMPANY

AMFORGE DIVISION

155 N. WACKER DRIVE, CHICAGO 6, ILLINOIS
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Link-Belt offers complete West Coast facilities



experienced engineering

Link-Belt is a world-recognized engineering firm. Our West Coast plants and offices have large engineering staffs with intimate knowledge of local conditions. Each plant is prepared to carry through complete installations from planning through manufacture and erection.

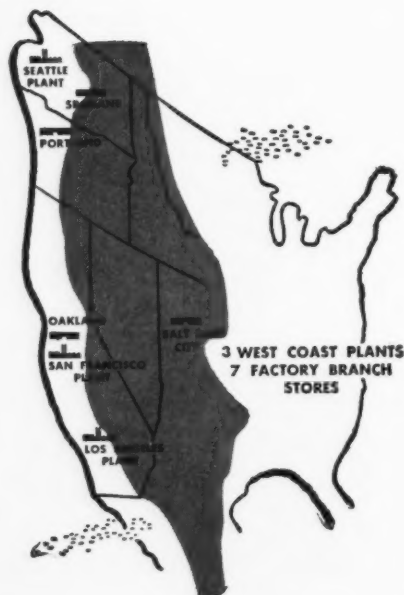


convenient warehousing

In the seven major Western industrial areas, Link-Belt maintains over-the-counter service on a complete range of power transmission, conveying and elevating products. There are factory branch stores to serve you at Spokane, Seattle, San Francisco, Salt Lake City, Portland, Oakland and Los Angeles. In addition, 30 authorized stock-carrying distributors in the West stock Link-Belt products.



**One source . . . one responsibility for materials
handling and power transmission machinery**

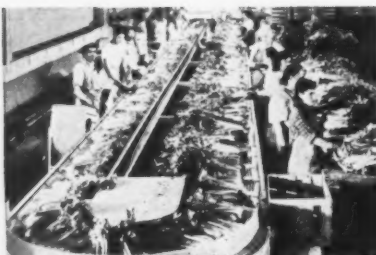


modern fabricating facilities

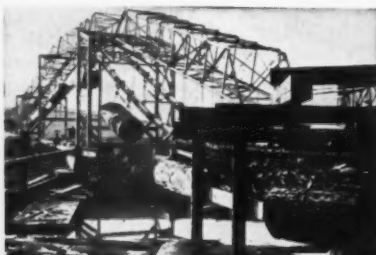
Link-Belt operates three modern plants in the West—at San Francisco, Los Angeles and Seattle. Not only do these facilities help speed deliveries—they also save money on freight costs compared to Eastern shipments.

Turn to Link-Belt for all your conveying, elevating, processing and power transmission needs. Link-Belt West Coast operations include facilities for design, fabrication and erection of complete installations as well as individual products.

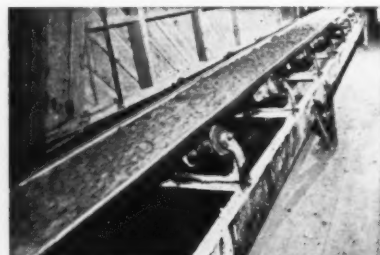
With a broad line of equipment and comprehensive engineering background, Link-Belt offers one source for a system tailored to your exact requirements. Call your local Link-Belt office for an expert analysis of your needs.



California packer uses Link-Belt flat-top packing-table conveyor for efficient, low-cost inspection and packing of celery.



At Idaho sawmill, Link-Belt trolley conveyor carries peeler logs from mill pond to barker in veneer plant.

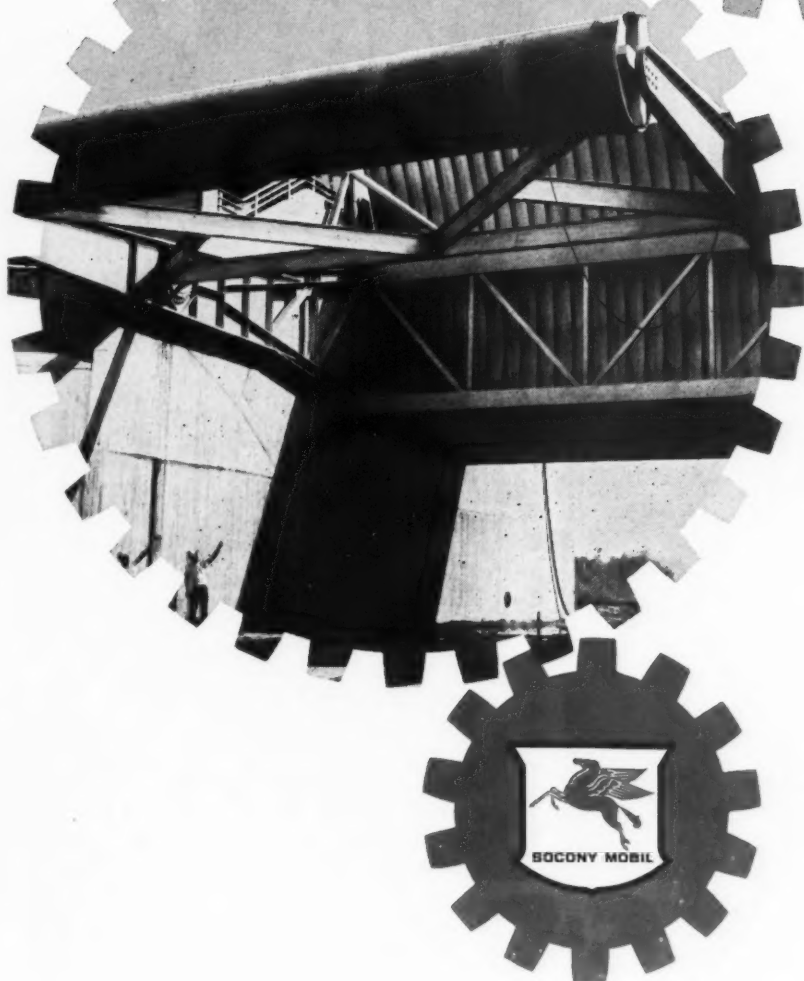
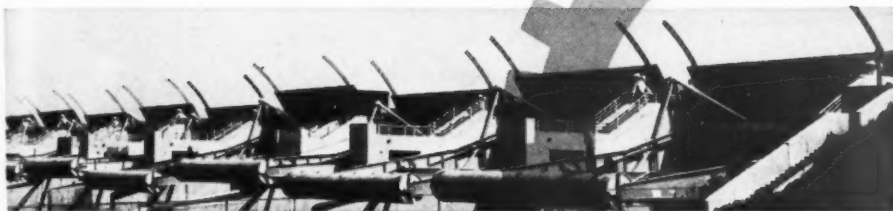


Inclined 24-in. wide Link-Belt belt conveyor transports crushed, screened lead-zinc ore to 3000-ton capacity ore bin.

LINK-BELT COMPANY: Plants, Sales Offices and Factory Branch Stores at San Francisco 24, Los Angeles 33, Seattle 4, Sales Offices and Factory Branch Stores at Portland 10, Spokane 10, Oakland 7, Salt Lake City 1. Stock Carrying Distributors in Principal Areas.

... for more details, circle No. 12 on Reader Service Postcard

WESTERN INDUSTRY — November 1955



Latest project in the vast Southern California flood control network, Whittier Narrows Dam will safeguard an estimated 1,000,000 residents and \$3,000,000 in property from waters of the San Gabriel River.

The nine all-steel control gates which line the three-mile dam operate automatically by means of weight-counterweight devices. A three horsepower auxiliary motor with 1786 to 1 reduction gears can move gate, counterbalance and float — a total weight of nearly 200 tons.

With extreme conditions of load and thrust being placed on the gears, bearings and sheaves which operate the gates, the selection of proper lubricants was vital. J. R. Cantrall Co. of El Monte, Calif., the firm that installed the massive gate structures, selected Gargoyle oils and greases to protect this machinery, following an intensive survey by General Petroleum's lube engineers.

Your plant, too, can have the added protection of G.P.'s industrial maintenance program. Just call your nearest General Petroleum office today for the tops in product and service.

GENERAL PETROLEUM CORPORATION

... for more details, circle No. 13 on Reader Service Postcard

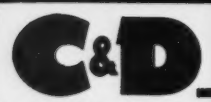
For fast industrial battery service ... save this map!



- 1 Atlanta, Ga., Northside Station—Box 153, Cherokee 3790
- 2 Baltimore, Md., 2406 N. Charles Street, Hopkins 7-1020
- 3 Baton Rouge, La., 4445 Sweetbriar, 3-6215
- 4 Birmingham, Ala., P. O. Box 5987—Homewood Station, 2-0064
- 5 Boston, Mass., 49 Mt. Auburn St., Watertown, Mass., Watertown 4-5200
- 6 Buffalo, N. Y., 443 Delaware Ave., Madison 5256
- 7 Charlotte, N. C., P. O. Box 9201, Edison 4-9739
- 8 Chicago, Ill., 3454 W. Lake St., Sacramento 2-6750
- 9 Cleveland, Ohio, 14812-20 Detroit Ave., Blvd. 2-3130
- 10 Dallas, Texas, 705 Praetorian Bldg., Prospect 2271
- 11 Denver, Colo., 1732 Blake St., Cherry 4-1102
- 12 Detroit, Mich., 15336 W. Warren Ave., Dearborn, Mich., Tiffany 6-8712
- 13 Indianapolis, Ind., 230 E. Ohio Street, Melrose 2-5962
- 14 Jackson, Miss., 429 S. West St.—Box 1085, 5-8305
- 15 Jacksonville, Fla., 3540 Remington St.—Box 6254, Evergreen 8-6390
- 16 Kansas City, Mo., 410 E. 27th Terrace, Victor 1742
- 17 Little Rock, Ark., 400 Shall St.—Rm. 114, Fr. 4-8314
- 18 Los Angeles, Calif., 1014 Venice Blvd., Richmond 9-5698

- 19 Memphis, Tenn., 2523 Broad Ave., P. O. Box 5131, Birmingham Station, 33-8981
- 20 Milwaukee, Wisc., 5625 W. Wells St., Greenfield 6-0153
- 21 New Orleans, La., 820 Julia Street, Tulane 5207
- 22 New York City, 198 Pavonia Ave., Jersey City, N. J., Journal Sq. 2-4842, 4843
- 23 Omaha, Nebr., 3213 N. 16th St., Atlantic 5340
- 24 Philadelphia, Pa., 5th St. at Cheltenham Ave., Majestic 5-4410, 4411
- 25 Pittsburgh, Pa., 727 Penn. Ave., Churchill 1-9051
- 26 Portland, Ore., 427 N.E. Cook St., Tuxedo 1449
- 27 Richmond, Va., 4101 Bremner Blvd., Richmond 88-8432
- 28 Rock Island, Ill., 218 Safety Bldg., R. 1-8-2181
- 29 San Diego, Calif., 722 Fern Glen, La Jolla, Calif., Glencourt 4-6757
- 30 San Francisco, Calif., 725 Second Street, Sutter 1-5591
- 31 Seattle, Wash., 2911 First Ave., South, Main 7488
- 32 Spokane, Wash., E. 125 Mission St., Fairfax 5379
- 33 St. Louis, Mo., 559 N. Skinner Blvd., Volunteer 3-6171
- 34 Syracuse, N. Y., 402 S. Townsend St., 75-7978
- 35 Tulsa, Okla., 214 East 12th St., 2-3197
- 36 Washington, D. C., Suite 344, Washington Bldg., National 8-1852

Wherever you may be, there is a C & D service representative nearby to serve your needs. If you have any questions concerning industrial batteries or maintenance, one of C & D's trained service representatives listed above will be glad to serve you.



BATTERIES, INC.
of Conshohocken, Pa.

Industrial Batteries since 1906

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST



PURCHASING'S ROLE IN TUBING SELECTION

Even after a purchase requisition calling for tubing for any specific pressure or mechanical application is written, the purchasing agent must weigh many considerations.

In addition to selecting a tubing manufacturer, he must determine the type of length to order (random, multiple or cut length), quantity factors, alternate choice of seamless or welded, and alternate grades. All these factors can easily influence

cost and/or delivery.

More and more alert purchasing agents are adopting B&W as their principal tubing supplier because B&W, in addition to offering literally millions of combinations to meet practically every conceivable tubing need, provides through Mr. Tubes—their link to B&W—the kind of friendly service that helps them get the most for their money.



(TA-5052 G)

THE BARCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa. and Milwaukee, Wis.: Seamless Tubing,
Welded Stainless Steel Tubing
Alliance, Ohio: Welded Carbon Steel Tubing
Milwaukee, Wis.: Seamless Welding Fittings

111 Wilshire Blvd., Los Angeles 17, Calif.; 785 Market Street, San Francisco 3, Calif.

... for more details, circle No. 15 on Reader Service Postcard

FROM CONNECTORS TO OVENS

Metal & Thermit and its distributors carry a complete line of arc welding accessories. Selected for their quality, and stocked for your buying convenience, they are always on hand when you need them.

Buying your welding accessories, Murex Electrodes, and M & T Welding Machines from one dependable source assures you prompt delivery, personalized service, and purchasing economy. Buying M & T down the line is good safety insurance too, because every product has been field tested to serve you well.

For a copy of the M & T accessories catalog contact your nearest M & T branch office, or write.



Terminal Connectors



Gloves



Ground Clamps



Electrode Holders



Cleaning Tools



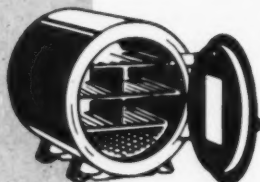
Goggles



Welding Helmets



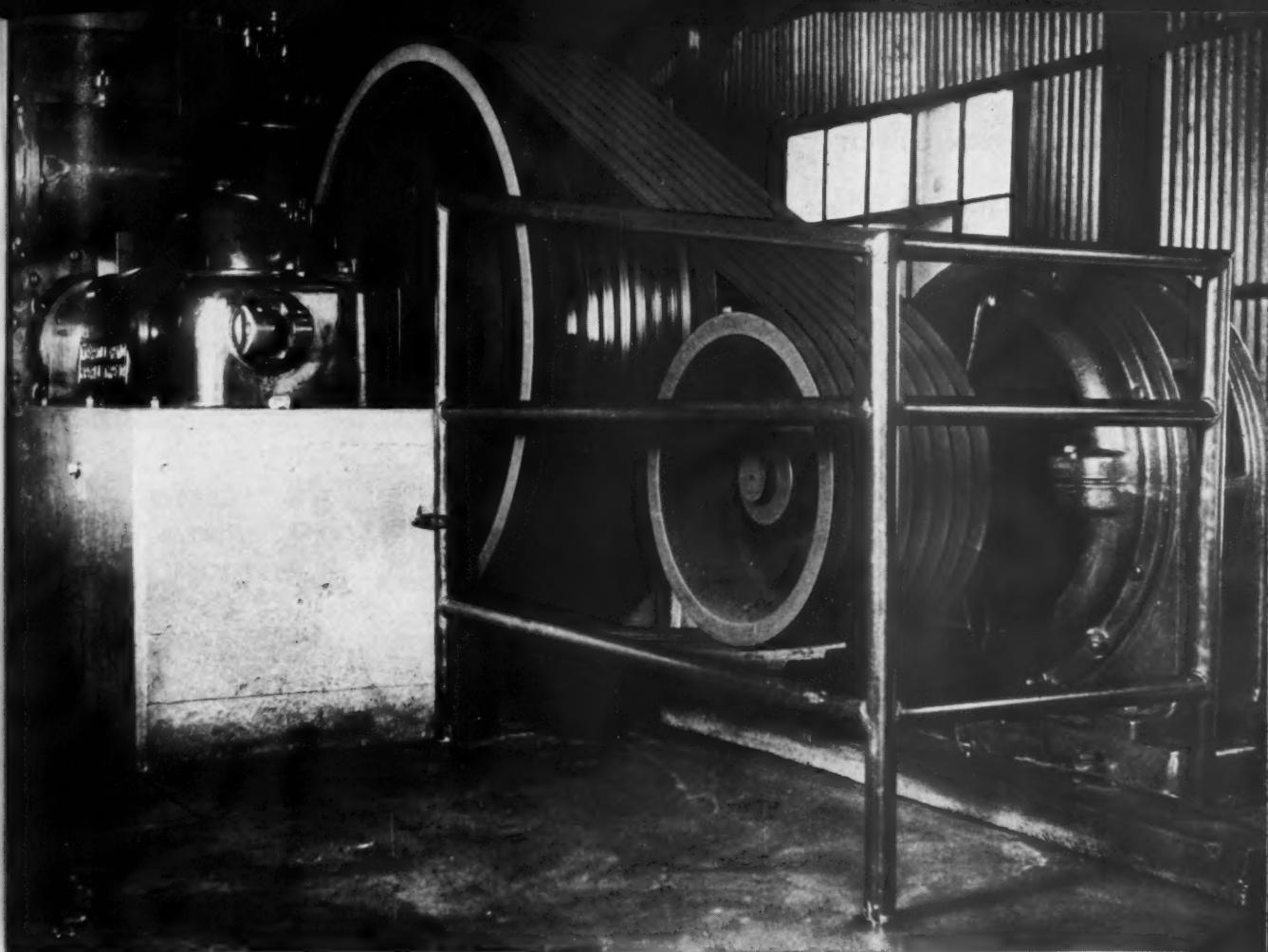
Power Cable



Electrode Ovens

METAL & THERMIT CORPORATION • WELDING DEPARTMENT • 100 EAST 42ND STREET, NEW YORK 17, N.Y.

... for more details, circle No. 16 on Reader Service Postcard
WESTERN INDUSTRY — November 1955



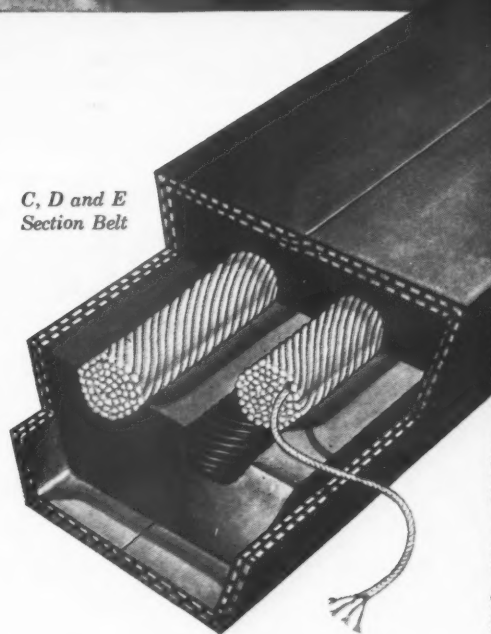
Thermoid Multi-V Belts cut operating costs



There's a Thermoid V-Belt for every plant application. Every belt is *pre-stretched* to provide longer service and maximum power transmission without slippage. Thermoid C, D and E sections are rayon-grommited for brute strength and extra flexibility that withstands repeated shock loads. The entire belt is vulcanized into a solid unit that resists moisture, abrasion, internal friction and heat.

Get longer wear with less maintenance . . . cut your operating costs with Thermoid Multi-V Belts. To meet the exacting requirements of any plant service, your Thermoid Distributor carries a complete line of Thermoid Multi-V Belts, Hose and Conveyor Belting. Call him or write direct for complete information.

C, D and E
Section Belt



Thermoid

Western Co.



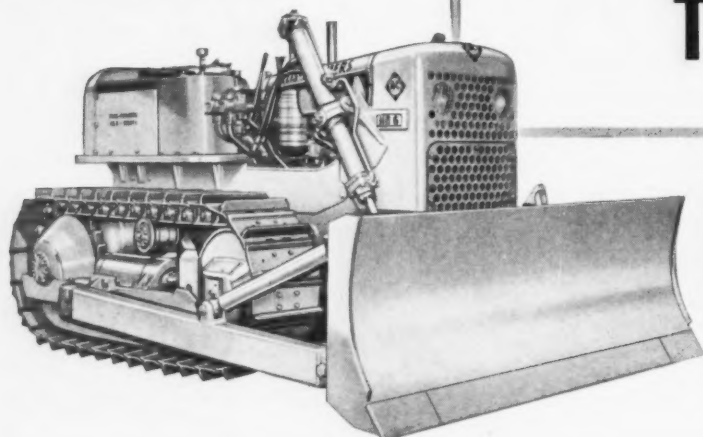
Conveyor & Elevator Belting • Transmission Belting • F.H.P. & Multiple V-Belts
Wrapped & Molded Hose • Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Offices and Factories: Trenton, N. J. Nephi, Utah

... for more details, circle No. 17 on Reader Service Postcard

more performance
FOR SUSTAINED HIGH OUTPUT!
more versatility
FOR A WIDER RANGE OF WORK!
more dependability
FOR LOWER JOB COSTS!

ALLIS-CHALMERS ANNOUNCES TWO NEW HD-6 SERIES TRACTORS



HD-6 BULLDOZER- DRAWBAR TRACTOR

Weight12,400 lb
Drawbar hp45
Belt hp55

STEP UP PERFORMANCE, CUT JOB COSTS WITH EXCLUSIVE HD-6 FEATURES LIKE THESE...

- Allis-Chalmers heavy-duty diesel engine
- Long-wearing ceramic master clutch lining
- All-steel box-A main frame
- One-piece steering clutch and final drive housing
- Double reduction final drives
- Roller bearing truck wheels
- Welded steel truck frames
- Tru-Dimension tracks
- 24-volt direct electric starting
- Unit construction
- 1,000-hour lubrication intervals
- Engine-mounted bulldozers

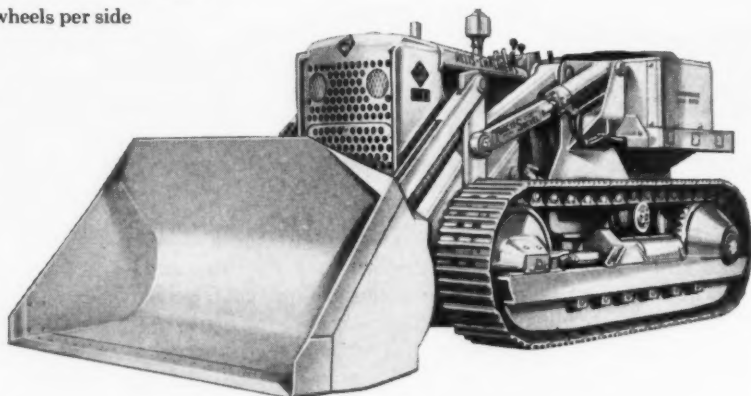
... PLUS TRACTOR SHOVEL FEATURES LIKE THESE...

- Extra-long track with six truck wheels per side
- New two-position bucket
- Heavy-duty shovel assembly
- Simple, safe hydraulic system
- Two-speed reverse

HD-6G

TRACTOR SHOVEL

Weight19,600 lb
Drawbar hp45
Net engine hp57
Bucket capacity1-1/3 cu yd



GET ALL THE FACTS NOW FROM YOUR NEARBY ALLIS-CHALMERS DEALER

CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS





Jacobs

Another of Garrett's
FAMOUS BRANDS

NEW JACOBS 96 COLLET CHUCK— TIGHTEST, MOST ACCURATE GRIP EVER DEVISED

With this new closure, the famous *Jacobs Rubber-Flex Collets* can be used on grinders, milling machines, jig borers, jig grinders, lathes, and a variety of special machinery. Safely grips thin-walled tubing... resilient and compressable materials like rubber, plastic or wood... brittle ceramics or glass.

Garrett Supply keeps up to date to keep you up to date. For more than 100 famous brands of tools and industrial supplies, and for advice on which new developments can be most help to you—"Get them from Garrett."

**HEADQUARTERS IN SOUTHERN
CALIFORNIA AND ARIZONA FOR THESE
AND OTHER FAMOUS BRANDS**

Yale & Towne Hoists
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IN LOS ANGELES
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GARRETT
SUPPLY COMPANY

3844 South Santa Fe Ave., Los Angeles 58, California

130 West Madison St., Phoenix, Arizona

a division of **THE GARRETT CORPORATION**



Don't always count a group drive out

NO DOUBT about it, unit motorization is here to stay. Many of the newest machines are supplied with not just one motor; many small motors power various portions of each machine's operation. For good appearance, flexibility, overhead clearance, efficiency, and worker morale, unit drives have been a welcome innovation.

Does this mean that the line shaft drive—which got its start in the days of the waterwheel and the steam engine—is on its way nowhere else but into the dusty opening chapters of the power textbooks? In a talk last month with a friend who runs a small-to-medium sized plant, we reaffirmed some good reasons why not.

A small shop, or possibly a non-production department of a larger plant, may have ten to fifteen machines but only four or five men to operate them. This usually means a maximum of five machines will be running at one time. With a group drive, then, horsepower of the single line shaft motor need be only enough to drive the largest five machines. With unit motors, connected horsepower (for which the power company is probably levying standby charges) would have to be three or four times greater. A good rule of thumb here is: If less than 50% of the machines in your shop or department are going to be in use at any one time, group drive may save you money.

For plants whose annual gross lacks abundant zeroes before the decimal point, here's another timely thought: Used machines driven from a line shaft are considerably cheaper than those individually driven. If you're still "crawling before you can walk," you may be better off with a group drive in your plant for quite a while yet.

What's wrong with the sales engineers?

"WE would like to see a better staff of technical people representing manufacturers here in the West. Very few seem to have a complete understanding of their own products." This is the plaint of a superintendent at one of our major Western wood products plants. With variations, we hear the same criticism more and more frequently around the West these days.

Who or what should be blamed? We could list a dozen points for reproach, none of them new. But, one source of this annoying problem is easily overlooked—the fact that this is another symptom of the growing shortage of trained engineers available to industry and the trade.

And, it is a symptom inevitably certain to show up soonest and strongest here in the West. Here, sales engineers are bucking the problem of keeping pace with explosive industrial expansion while also trying to serve plants adequately in sales territories often five, ten, and twenty times larger in area than those of their Eastern counterparts. For industrial distributors, and for plant operating executives too, it's no wonder that the problem of locating suitable engineering help is becoming painfully acute in the West.

So, it's nobody's fault, really. But more and more, it's becoming everybody's problem.

Water, pressures, and money

FROM Colorado to California, Western cities suffer various degrees of water hunger resulting in various degrees of civic pressure on local industrial plants to cut down water consumption in processing and production. The squeeze ends up usually on the plant engineer's doorstep as a terse instruction from the front office, "Use less water from now on, but don't spend any more money."

We don't know if that's how it came about at Solar Aircraft in San Diego, but we do know that Solar has a program well under way now that is saving not only water, but nearly six figures worth of dollars per year as well. The Solar chief plant engineer tells you about it in the article on page 44.

You can move up, maybe

IF you've got your eye on taking over your boss's job some day soon, what's the best way to prepare yourself? Should you be using up gallons of midnight oil studying the technology of your field? . . . or can you save time by simply cultivating those in power?

For that matter, what makes you think you're qualified to handle your boss's job anyhow?

The answers to these questions could be crucial to your job future. On page 46 of this issue, you'll find them, provided from the best source of all—your boss.

Electrical horse sense

"ON the general run of d.c. controllers a man with mechanical horse sense can accomplish an excellent job without wide technical knowledge . . . A man who tries to rely too much on theory and technical knowledge is, on the average, slow in getting equipment back into service."

Whether you agree or not with this opinion, you'll find the whole idea expanded and a lot of other electrical maintenance horse sense in the article on page 39.

Steel Problems ?



Call Jorgensen First

Just spouting off won't solve your steel problems. When you want real support, call Jorgensen for a direct pipeline of steel know-how, with complete warehouse stocks of mechanical and pressure tubing, as well as carbon, alloy, stainless, tool and specialty steels. If you need aluminum, Jorgensen's sheet, plate, rod, bar and extrusions are available for immediate delivery. Cap off your steel problems in a hurry — **CALL JORGENSEN FIRST!**



EARLE M. JORGENSEN CO. STEEL

LOS ANGELES
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LDrain 7-1122

OAKLAND
1657 W. Grand Ave.
Hlgate 4-2030

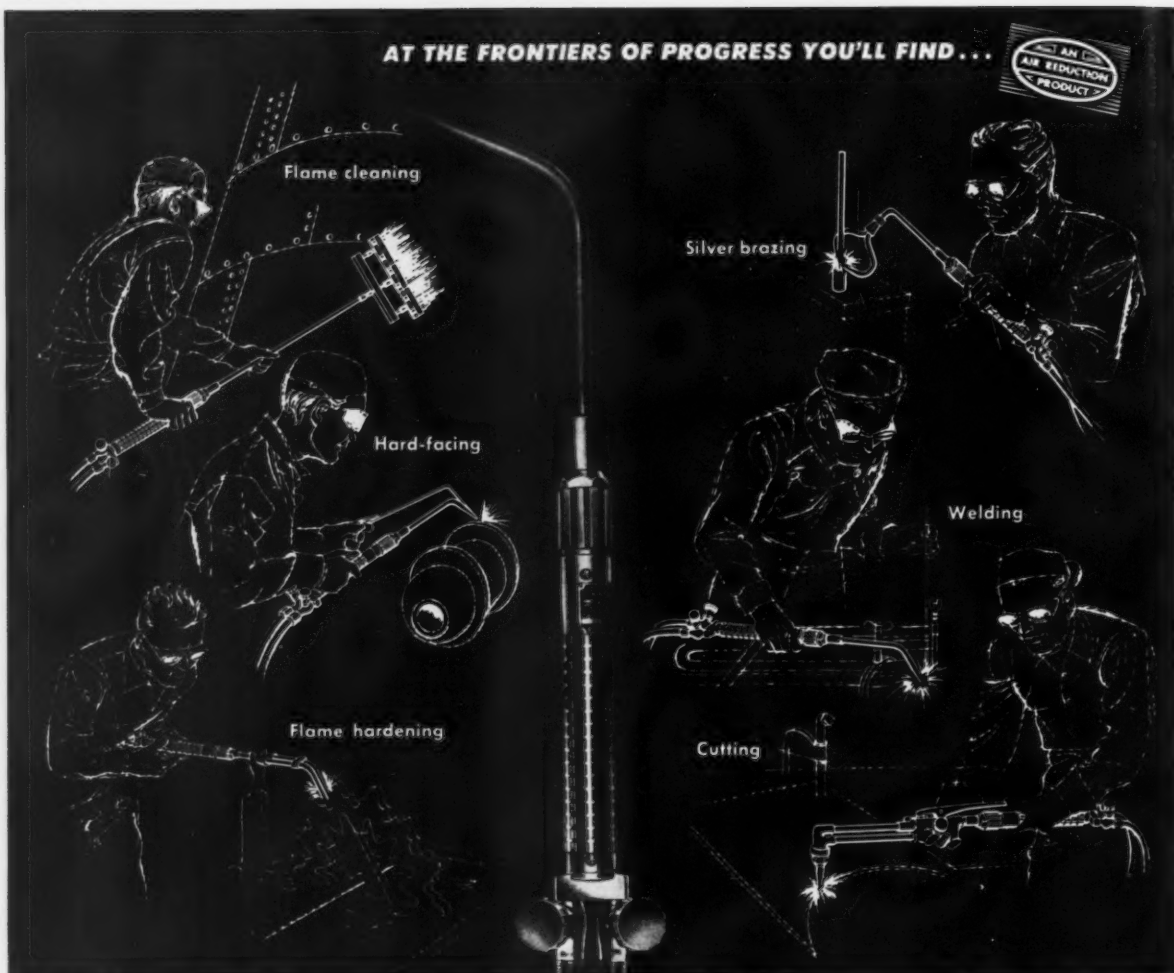
SAN FRANCISCO
700 Pennsylvania Ave.
Mission 7-7000

HOUSTON
5311 Clinton Dr
ORchard 2-1621

DALLAS
2200 W. Commerce St.
Riverside 1761

TULSA
7311 East Pine St.
TEmple 5-1511

AT THE FRONTIERS OF PROGRESS YOU'LL FIND ...



AIRCO 800 TORCH DOES THEM ALL

Airco 800 is the most useful torch you can buy. With one Airco 800 Torch and a suitable selection of tips you can perform brazing, welding and heating jobs better than with any other single torch. You can:

- weld cast iron and steel ranging from thin sheet up to the heaviest thicknesses
- braze weld steel and cast iron
- silver braze both ferrous and nonferrous metals
- preheat heavy castings and plate
- straighten and bend steel plates
- flame descale and dehydrate
- hard-face
- flame harden
- cut steel to 8" in thickness

Airco's high gas flow capacity and precision-drilled mixer provide the smooth constant supply of well mixed gas and steady flame that makes for top performance on all jobs, regardless of size.

Over 30 types of tips — each instantly interchangeable — from size 0 single flame up to size 15 multiframe are available. You can get either long or bulbous flame. Separable tips may be used with a Universal or Jet mixer. Cutting attachments will enable you to cut up to 8" plate. Catalog #818 tells all about the Airco 800 Torch, the light and medium Airco 700 Torch, and Airco's complete line of welding and cutting torches, tips and accessories. Contact your nearest Airco office or authorized Airco dealer; ask for your free copy.



**AIR REDUCTION
PACIFIC COMPANY**

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Oxygen, Acetylene and Other
Gases ... Carbide ... Gas Welding
and Cutting Machines,
Apparatus and Supplies ... Arc
Welders, Electrodes and Accessories

Air Reduction Pacific Company is a division of Air Reduction Company, Incorporated. Principal products of other divisions include: PURECO — carbon dioxide, liquid-solid ("DRY-ICE") • OHIO — medical gases and hospital equipment • NATIONAL CARBIDE — pipeline acetylene and calcium carbide • AIRCO — acetylenic chemicals • COLTON — polyvinyl-acetates, — alcohols, and other synthetic resins.

... for more details, circle No. 20 on Reader Service Postcard

WESTERN INDUSTRY — November 1955

**A
REVOLUTIONARY
NEW
PRINCIPLE
FOR
VIBRATING
SCREENS**

hi-G

Here, at last, is the answer to the demand for larger vibrating screens with lower power and space requirements . . . it's the revolutionary new Hewitt-Robins hi-G Screen.

Utilizing the principle of "modified resonance", the new Hewitt-Robins hi-G Screen develops a controlled, extremely sharp vibrating action. As a consequence, the hi-G Screen requires only small, easily accessible exciters, or vibrating units, and demands only one-quarter to one-half as much power as normally needed for comparable screens.

Hewitt-Robins
INCORPORATED  STAMFORD, CONN.

**EXECUTIVE OFFICES:
STAMFORD, CONNECTICUT**

Standard hi-G Screens are now available in sizes up to 6' wide by 28' long and require no more than a 15 HP drive.

Learn how a smaller vibrator can do a bigger screening operation for you with less power . . . Send in this coupon for full descriptive literature.

HEWITT-ROBINS INCORPORATED
Stamford, Connecticut

Gentlemen: Please send me complete descriptive literature on the new hi-G Vibrating Screen.

NAME
TITLE
COMPANY
STREET
CITY ZONE
STATE

Dept. W.I.

... for more details, circle No. 21 on Reader Service Postcard

LETTERS

Worth repeating

EDITOR—Another publication with national circulation is interested in the material contained in my article, "Lift trucks timed," that appeared in the August 1954 WESTERN INDUSTRY. I plan to use the same illustrations, but to revise the text. Is it all right if I

submit the revised article for publication elsewhere?

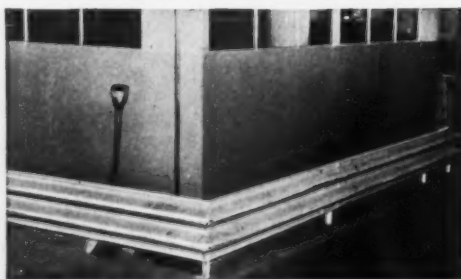
JOHN R. HUFFMAN

Department of Engineering, University of California at Los Angeles

(We're pleased that material appearing in WESTERN INDUSTRY—Huffman's article on the importance of training in attaining speedy lift truck operations, page 47, August 1954 issue—is judged so timely a year later by a national publication.—Ed.)

Improve plant safety and efficiency with

ARMCO FLEX-BEAM GUARDRAIL



FLEX-BEAM Guardrail protects factory office from damage by aisleway traffic.

This FLEX-BEAM Guardrail is in the parking lot of a new plant in California.

Since 1939, Armco FLEX-BEAM Guardrail has been used on highways throughout the country. Now it is finding an important application in industry—for parking lots and inside the plant for protecting expensive machinery, offices and similar installations from aisleway traffic.

FLEX-BEAM Guardrail is a deeply

corrugated all-steel, beam-type guardrail, securely spliced on 12½-foot centers by seven bolts. It may be attached to posts of wood, steel, pipe, angle iron, or structural members of buildings. Occasional painting is about the only maintenance needed. Installation is easy for small crew. Write for more details.

ARMCO DRAINAGE & METAL PRODUCTS, INC.

CALCO DIVISION

2610 Seventh Street
Berkeley 10, Calif.

6155 S. Malt Avenue
Los Angeles 22, Calif.

Armco FLEX-BEAM Guardrail



... for more details, circle No. 22 on Reader Service Postcard

More responsibility for I.E.'s

EDITOR—Thank you for mailing me a copy of Professor DeGarmo's first article from your July issue on "Industrial engineers in the small plant," as I requested.

A number of us were impressed by the simplicity and content of the second part of the article [September] and we felt we would like to have the whole story. It is my intention to use the data presented to sell our management on a greater responsibility being assigned to our Industrial Engineering Department.

D. A. STROMSOE

Executive Vice President, Southern Pipe & Casing Co., Azusa, Calif.

(Good luck on your sales campaign, Mr. Stromsoe. Judging from the many requests for extra copies of Professor DeGarmo's article, it is evident that many Western plants are ready to adopt industrial engineering or to expand its responsibilities.—Ed.)

Water treatment

EDITOR—My attention has been called to the articles you ran in WESTERN INDUSTRY on "Quality and treatment of water in the West." If a separate of these articles is still available, I would very much like to have it for my files on this subject.

M. A. JOSLYN

Department of Food Technology, University of California, Berkeley, Calif.

(In our answering letter we said, "These articles have been reprinted in a booklet, which is sold for 50c per copy. If you are still interested, send us your order." He was. We did. More copies of this booklet explaining the characteristics of water found in the many locations in the West and including a tabulation of water analyses for each principal city are available.—Ed.)

Needs boost

EDITOR—I noted with interest the article entitled "Production boost—individual incentive does it," which appeared in the July issue. If reprints of this article are available, I would appreciate a copy.

KEITH I. MILLER

Methods and Standards Department, Solar Manufacturing Corp., Los Angeles.

(Coming right up, Mr. Miller.—Ed.)

Standard Engineer's Field Report

CASE HISTORY
Calol Cutting Fluids
LUBRICANT

Lamson Mobilift Corp.,
FIRM *Portland, Oregon*

Low-cost cutting fluids save time and money on machine tool operations



AFTER TESTING many different cutting fluid solutions, Lamson Mobilift Corp. selected Calol Cutting Fluids for all machining operations. This Warner & Swasey 3A Turret Lathe (above) is drilling and forming generator gears, using Calol Soluble Oil. Unit operates at a surface speed up to 300 feet per minute and can handle any stock up to 16" in diameter. Plant Foreman Lloyd McCartney reports: "Of all the products we've tried, Calol Cutting Fluids do the best job of keeping tools and work cool. Be-

cause of this, they've speeded up our machining operations and save us time and money." This company manufactures all components, including engine parts, for their Mobilift fork trucks. Other Calol products in use are Calol Cutting Oil 33DA and Calol TR Compound on tapping machines.



TRADEMARK "CALOL" REG. U. S. PAT. OFF.

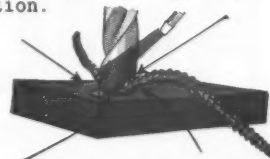
Free Folder on Improved Calol Cutting Fluids sent on request to Standard Oil Company of California, 225 Bush St., San Francisco, California.

For Expert Help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative, or write to 225 Bush Street, San Francisco, California.

Why Calol Cutting Fluids solve metal-cutting problems

Specialized products for every metal-cutting operation.

Additives resist rusting, corrosion, pressure.



Flush away cuttings readily.

High cooling and lubricating qualities. Very stable.

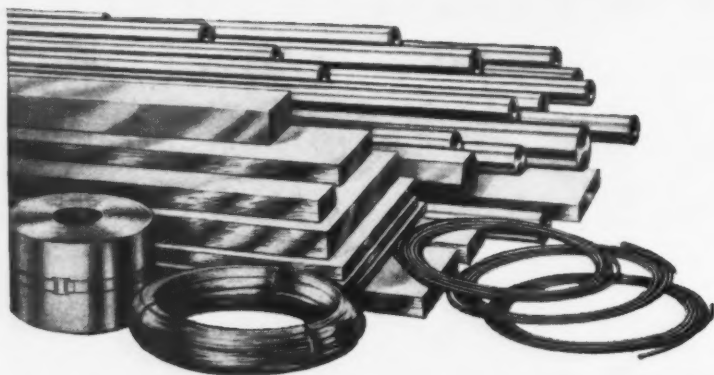
STANDARD OIL COMPANY OF CALIFORNIA

OLD FRIEND!



Since 1876, the name Chase has been the symbol of *top quality in brass and copper*. It also stands for *unmatched service!* Twenty-five Chase warehouses and three Chase mills form the most responsive and efficient source of brass and copper supply in the nation!

NEW SERVICE!



Now the Chase network assures you a dependable source of stainless steel, too! You specify the type, form and quantity. The Chase warehouse near you has it in stock—or will get it to you on the double, direct from another Chase warehouse or the mills. Call Chase today! Get those service experts working for *you* on your stainless steel requirements!

STAINLESS STEEL!

Chase 
BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

The Nation's Headquarters for Brass & Copper

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SEATTLE 4, WASH. 1957 First Ave., South, Tel. SENeca 1862
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WESTERN INDUSTRY — November 1955

American Blower
Ventura Fans
offer you

top performance and economical ventilation

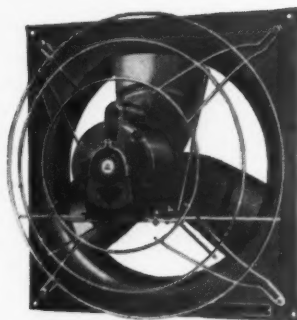
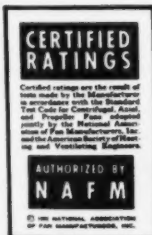


American Blower Model K Ventura Fan

You can count on American Blower Ventura Fans to do the job they are designed for, with high efficiency and a minimum of maintenance. They are built for long life and top performance. All ratings are certified.

American Blower Model K Ventura Fans are ruggedly constructed, heavy-duty propeller fans for tough industrial applications. They offer the power you need . . . when you need it, and will operate against static pressures up to $\frac{5}{8}$ ". Request Bulletin 6514.

American Blower Ventura Fans are attractively designed, quality built, and easy to install . . . yet *competitively priced*. Ventura Fans come in a wide range of sizes and capacities — with constant-speed and two-speed direct drives, totally enclosed motors — to satisfy your exact requirements.



Model G Ventura Fans

Model G, at left, is a sturdily built and attractive fan suitable for light industrial duty and commercial applications. It is especially quiet-operating, making it ideal for offices, stores, and lobbies — or wherever quiet operation is required. Write for your copy of Bulletin 6414, which gives complete performance data.

American Blower products serve industry

Air Conditioning, Heating,
Ventilating Equipment
Mechanical Draft Equipment
Industrial Fans and Blowers
Centrifugal Compressors
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AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

AMERICAN BLOWER



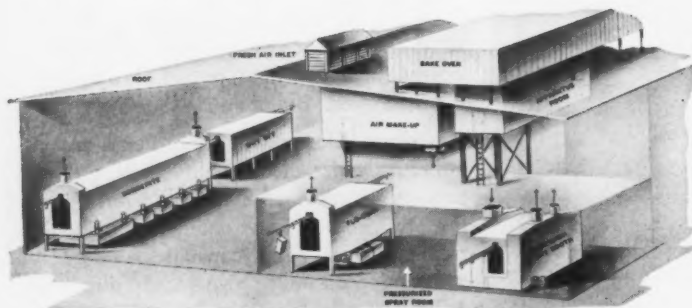
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Balanced Units For Proper Performance

ROSS

Complete

Paint Finishing System



Typical Layout of ROSS Paint Finishing System

WASHING • BONDERIZING • SPRAY BOOTHS
FLOW-COAT • DRYING • BAKING • CONVEYING

Leading manufacturers are installing these complete ROSS Systems to secure perfect coordination of all components with each unit carefully balanced for proper performance. Today's need is for uniformity of finish. With all major units designed, built and installed by ROSS, uniformity with the required production speed is assured.

For details on these and the many other ROSS Systems for more efficient production, send for our Bulletin S-3

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Main Office: 444 MADISON AVE., NEW YORK 22, N. Y.

West Coast Offices Located At

6417 BANDINI BLVD., LOS ANGELES, CAL.

823 SKINNER BLDG., SEATTLE, WASH.

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CALENDAR OF MEETINGS

NOV. 17-18—National Assoc. of Corrosion Engineers, Western regional meeting, Sir Francis Drake Hotel, San Francisco. Contact R. S. Treseder, Shell Development Co., Emeryville, Calif.

NOV. 30-DEC. 2—Aircraft Industries Assoc., regional conference, Arizona Biltmore, Phoenix, Ariz. Contact AIA offices, 7660 Beverly Blvd., Los Angeles 36.

DEC. 2-3—Northwest Mining Assoc., Davenport Hotel, Spokane. Contact Karl Jasper, c/o Spokane Chamber of Commerce, or phone MA 4822.

DEC. 7-9—Western Frozen Foods Processors Assoc., Hotel Senator, Sacramento. Contact A. H. Harrison, managing director, 244 California St., San Francisco.

1956

JAN. 5-7—Northwest Cannery Assoc., 42d annual convention, Multnomah Hotel, Portland, Ore. Contact C. R. Tulley, NCA, Board of Trade Building, Portland 4.

JAN. 8-10—Northwest Frozen Foods Assoc., convention, Multnomah Hotel, Portland, Ore. Contact Assoc. headquarters, Title and Trust Bldg., Portland 4.

JAN. 18—Western Labor Management Relations Conference, Fairmont Hotel, San Francisco. U. S. and California State Chambers of Commerce, sponsors. Contact James D. Gofourth, Calif. State C. of C., 350 Bush St., San Francisco.

FEB. 2-3—Manufacturing Section, Governor's Industrial Safety Conference, Fairmont Hotel, San Francisco. Contact Michael Flagg, editor, California Safety News, State Department of Industrial Relations, 965 Mission St., San Francisco.

APR. 5-7—8th Biennial Electrical Industry Show, sponsored by Electrical Maintenance Engineers Assoc., Shrine Exposition Hall, Los Angeles. Contact Show headquarters, 3443 So. Hill St., Los Angeles 7.

APR. 18-21—Copper and Brass Warehouse Assoc., Inc., annual meeting, San Marcos Hotel, Chandler, Ariz. Contact David A. Heller, director, public relations, Assoc. offices, Suite 1025, 15th and K Sts., N. W., Washington 5, D. C.

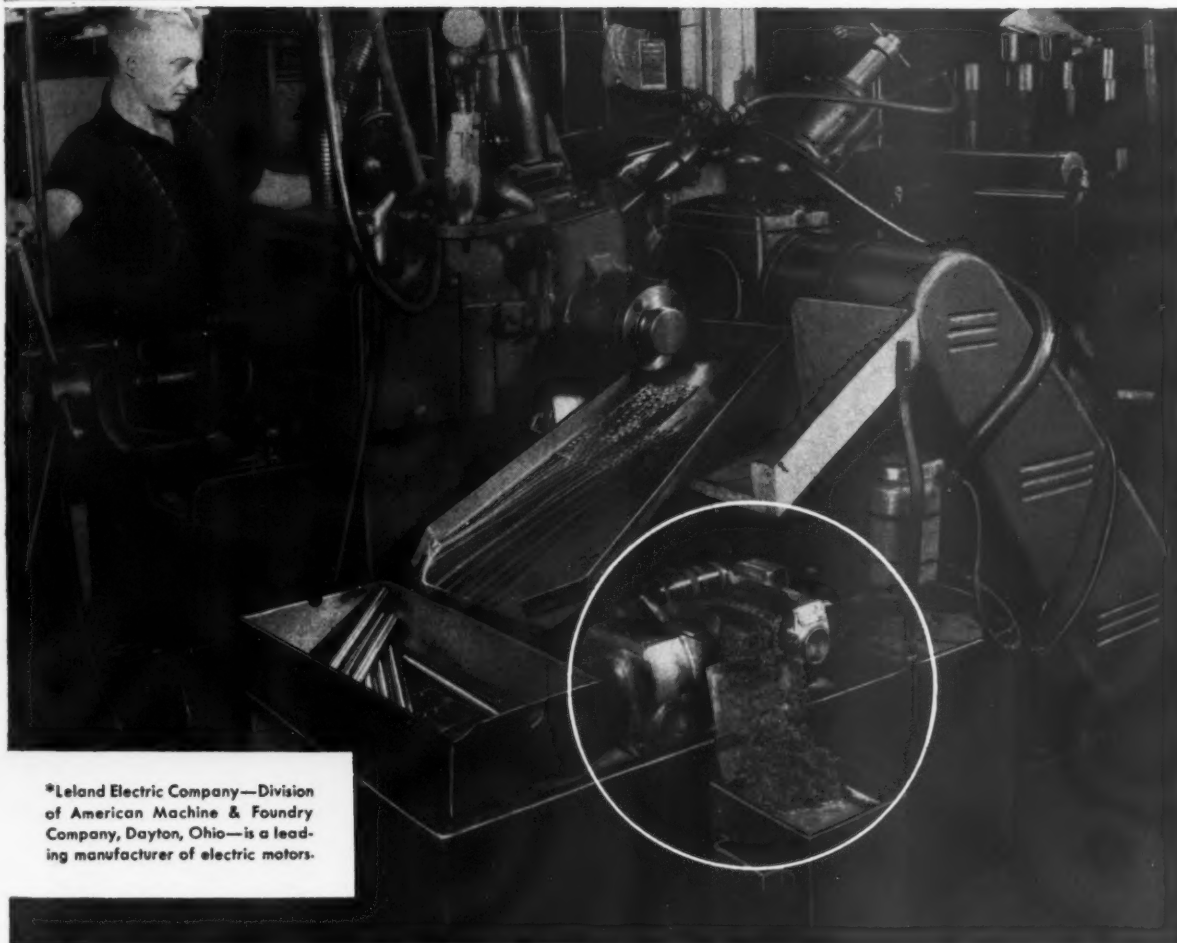
APR. 27-28—Western Regional Conference, American Institute of Industrial Engineers, Hotel Mark Hopkins, San Francisco. Contact James Nordahl, Coast Manufacturing and Supply Co., Livermore, Calif.

MAY 6-8—American Steel Warehouse Assoc., Inc., Hotel Mark Hopkins, San Francisco. Contact Walter S. Dossy, president, 442 Terminal Tower, Cleveland 13, Ohio.

GRINDING
MACHINE
COOLANT
CLARIFICATION

HOUDAILLE MAGNETIC SEPARATORS

save \$2230 annually for Leland Electric Company*



*Leland Electric Company—Division of American Machine & Foundry Company, Dayton, Ohio—is a leading manufacturer of electric motors.

● Coolant contamination is no longer a problem in Leland Electric's armature shaft grinding department.

Five Houdaille Magnetic Separators—mounted on grinder sumps—provide machines with a constant supply of clean coolant. Separator shown above removes 62 pounds of metallic chips and sludge daily.

Annual savings in coolant and maintenance costs total \$2230. Other benefits include longer wheel life, better product finish, more sanitary working conditions.

The Houdaille Magnetic Separator is designed for complete removal of ferrous metal chips and abrasives. Compact, lightweight, easy to install. Uses no floor space, needs no separate pump and motor. 10, 20, 40 GPM capacities. Write for Equipment Bulletin 601 and 4-page Leland case history.

A SUBSIDIARY OF HOUDAILLE-HERSHEY CORP.

662 Wabash Avenue
Lebanon, Indiana

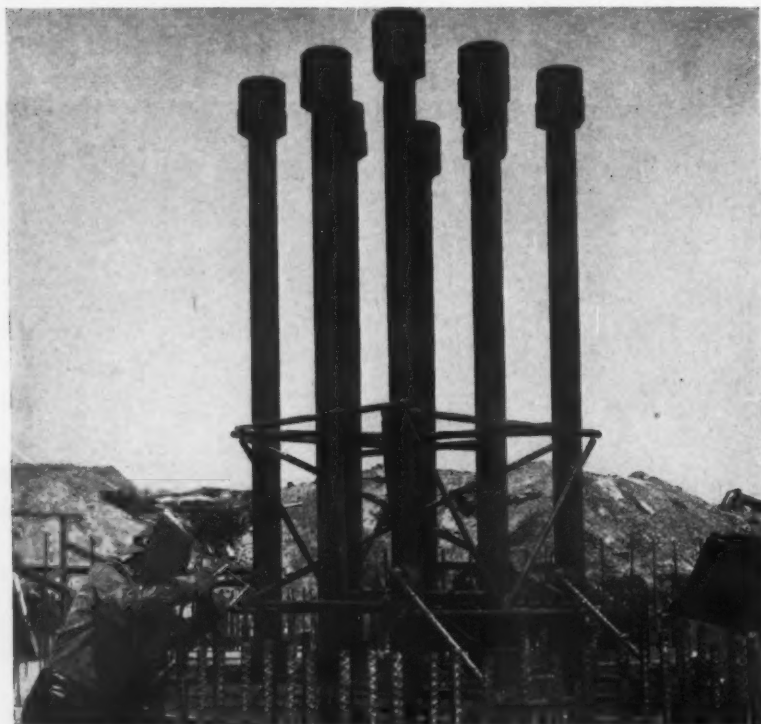
HOUDAILLE-HERSHEY OF INDIANA, INC.

FILTRATION DIVISION

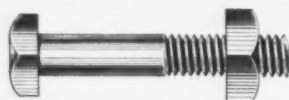
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BETHLEHEM PACIFIC

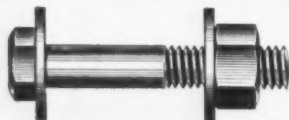
Your Headquarters for Fasteners



These 4-in. diam anchor bolts were made in our South San Francisco Plant. These assemblies were placed within concrete pedestals to anchor the massive steel structure supporting the boilers at the P. G. & E. power plant in Pittsburg. Bechtel Corporation was the general contractor.



MACHINE BOLTS. Made to ASTM Specification A-7. Also in standard grades of carbon or alloy steel. Heads are square, hex, tee, button or countersunk. Cut or rolled threads.



HIGH-STRENGTH STRUCTURAL BOLTS. Heat-treated to meet ASTM Specification A-325. All sizes from $\frac{1}{2}$ to $1\frac{1}{4}$ in. in varying lengths. Usually supplied with hexagon head, two hardened washers, and heavy hexagon nut.



SLEEVE NUTS. Top diameters from $\frac{3}{8}$ to 4 in. Usually tapped right-hand at one end, left-hand at other. Also furnished with right-hand threads throughout.



TIE RODS. Round or square rods in lengths up to 65 ft. Standard or special threads, cut or rolled. Single or multiple units. Galvanized, painted or asphaltum-dipped.



TIMBER BOLTS. Tight grip assured by four diamond-shaped lugs under head. Requires no washer, will not turn in timber. Eliminates counter-boring and retards dry rot. Square-head bridge bolt, with integral forged washer under the head, also available in varying lengths.



CLEVISES. Drop-forged. Usually tapped to Coarse Thread Series, Class 2. Right- or left-hand threads, with or without pin and cotter.

BOLT SPECIALS. You name it, and we'll make it at one of our three modern bolt and nut plants on the West Coast. Whether it's a ladder rung, a hanger pin or a special bolt—we can make a wide variety of specialties to your specifications.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: Los Angeles, Phoenix, San Francisco,
Portland, Seattle, Spokane

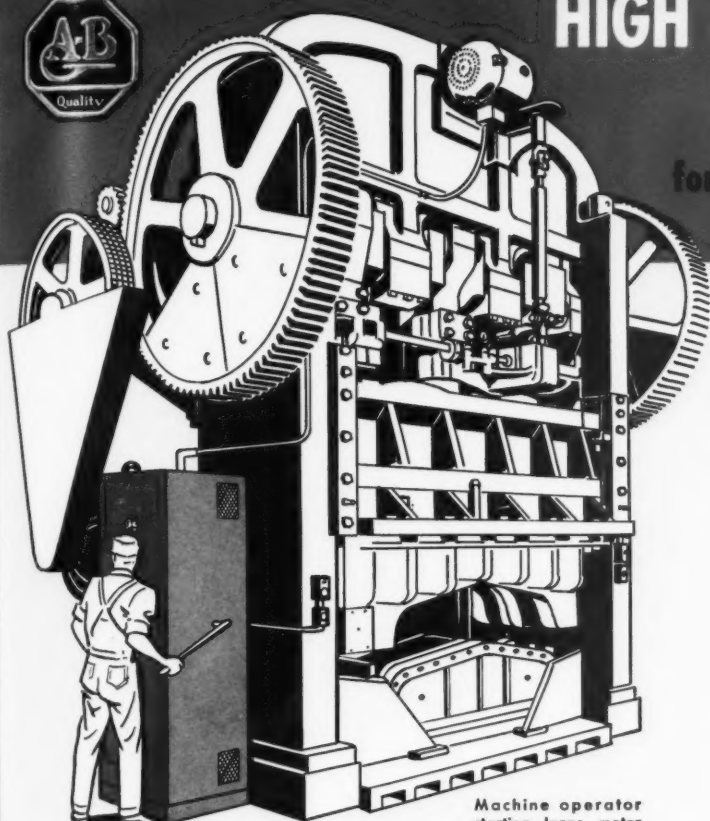


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WESTERN INDUSTRY — November 1955



HIGH & LOW VOLTAGE STARTERS for BIG MOTORS



Machine operator starting large motor with Bulletin 640 manual velvet smooth starter. Starting jolts are eliminated.

BIG STARTERS for big motors... for 220-440-550 volts... for 2000 to 2500 volts... and for 2501 to 4600 volts... are catalog listed units in the Allen-Bradley line. Illustrated below is a limited variety of starters for squirrel cage, wound-rotor, and synchronous motors. Starters for manual or automatic operation are available. Starters for 600 volts or less are available in ratings up to 600 hp. High voltage starters are rated up to 1500 hp.

Write for a copy of the Allen-Bradley Handy Catalog in which all varieties of "big starters" are listed. It is also a handy buyer's guide on the latest developments in controls and accessories.

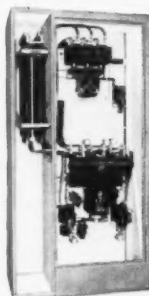
Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wisconsin
In Canada
Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

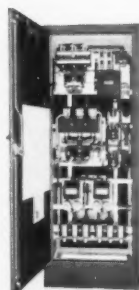
A FEW OF THE BIG STARTERS IN THE ALLEN-BRADLEY LINE



Bulletin 646 manual autotransformer type starter



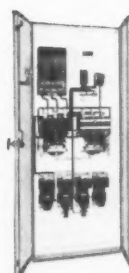
Bulletin 740 automatic reduced voltage motor starter



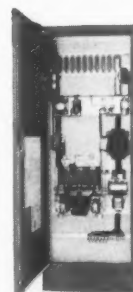
Bulletin 742 automatic starter—velvet smooth acceleration



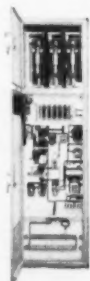
Bulletin 746 automatic autotransformer type starter



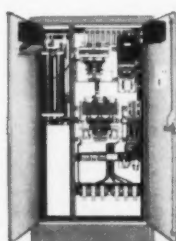
Bulletin 761 automatic wound-rotor motor starter



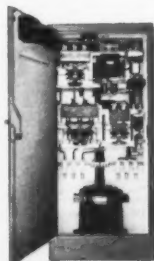
Bulletin 906 across-the-line synchronous motor starter



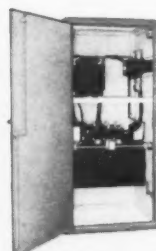
Bulletin 906 high voltage synchronous motor starter



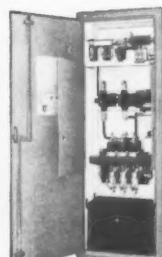
Bulletin 914 reduced voltage synchronous motor starter



Bulletin 922 low voltage synchronous motor starter



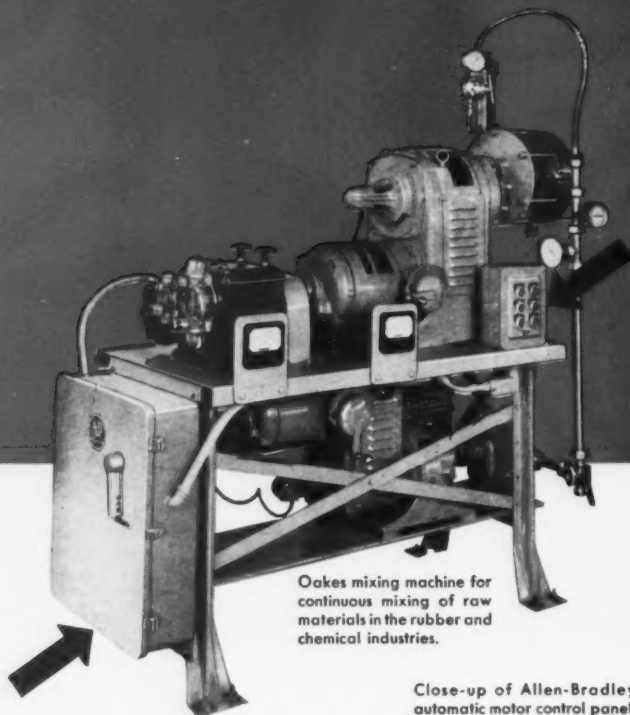
Bulletin 922 high voltage synchronous motor starter



Bulletin 1109 high voltage across-the-line starter



Bulletin 1146 high voltage squirrel-cage motor starter

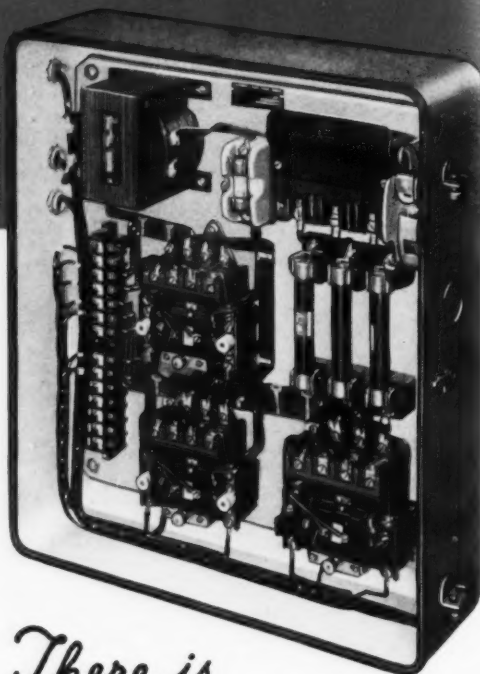


Oakes mixing machine for continuous mixing of raw materials in the rubber and chemical industries.

Close-up of Allen-Bradley automatic motor control panel.



The Sign of
QUALITY
MOTOR CONTROL



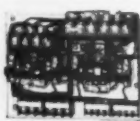
Service-tested Components for Automation Control Panels



Reversing
Switch



Solenoid
Starter



Multispeed
Starter



Solenoid
Relay



Pilot
Switch



Drum
Switch



Pneumatic
Timer



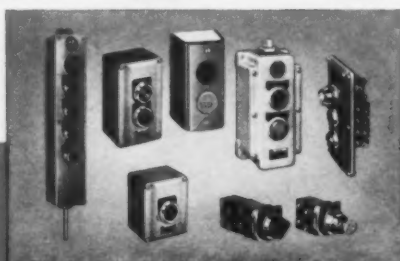
Pressure
Switch



Zero Speed
Switch



Limit
Switches



Push Buttons

There is **SALES VALUE for YOU** **in the A-B TRADEMARK**

Time has established the A-B trademark as the sign of Quality in motor controls. It is so recognized by the buyers of your motorized machines. So, why not standardize on Allen-Bradley controls.

Years and years of trouble free service in every conceivable industry has proved conclusively that A-B controls are a real sales asset to any machine. You just cannot beat Allen-Bradley controls for simplicity in design... your guarantee for reliable and consistent performance.

Whether you need a single starter or an all-inclusive special control panel, call in your nearest Allen-Bradley sales engineer. Let him recommend the components that will assure the most continuous output from your machines.

Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wisconsin

In Canada—Allen-Bradley Canada Ltd.
Galt, Ont.

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL



Q.

Why does Blanchard grind its own machine parts on a Blanchard?



A.

It's the only way we know to get highest quality at lowest cost!

Shown here are 117 different parts of a #18 Blanchard Grinder. 239 surfaces on these 117 parts were ground on a Blanchard, for the simple reason that *there isn't any better way.*

Everyone who uses Blanchard Grinders knows that Blanchard elements are machined with extreme accuracy... that they *have to be!*

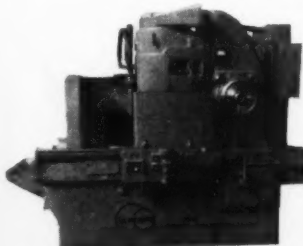
Furthermore, Blanchard users everywhere would undoubtedly agree fully with these two actual statements recently made by customers:

"There is no greater machine tool money value than a Blanchard. It is the best buy we ever made".

"Until our Blanchard went to work, I never realized I could actually save so much, as compared to previous methods of machining flat surfaces".

If you do not own a Blanchard, we invite you to select some of your own components, and let us give you estimates to compare with your present quality control tolerances and machining costs. Chances are you'll find it will pay you to **"PUT IT ON THE BLANCHARD"**.

P. S. You guarantee yourself full benefit from your Blanchard Grinders when you use the correct Blanchard abrasive wheels!



PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY



Send for free copies of "Work Done on the Blanchard", (fourth edition), and "The Art of Blanchard Surface Grinding".



64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

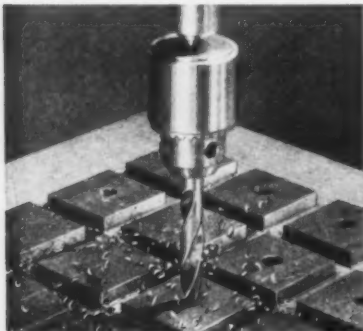
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(Advertisement)

WHAT'S NEW IN STEEL FROM STOCK

Now—Leaded Plates

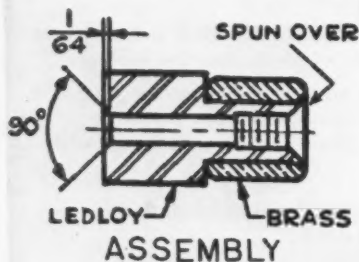
First stocks of leaded steel plates available anywhere are now on hand at Ryerson—and users are reporting results as remarkable as those achieved by thousands of companies with leaded steel bars. Tests show that New E-Z-Cut leaded plates cut faster, take a sounder weld, and polish to a high finish more readily than non-leaded



E-Z-Cut plates. And because sulphur content is much lower New E-Z-Cut is a much cleaner steel, free from troublesome sulphide stringers. First stocks include thicknesses up through 3".

Leaded Bars Make News

Ledloy from Ryerson attracted a good deal of attention at the Chicago Machine Tool Show this fall when three leading machine tool manufacturers chose this amazingly fast-cutting leaded bar steel to demonstrate the efficiency of their latest equipment. For example, the part shown here was machined from Ledloy and assembled with its brass ferrule at a rate of 200 per hour by one tool builder. And at the A.S.M. Show in Philadelphia machining demonstrations showed that the new Ryerson leaded alloy steel Ryeut 40 in-



creases tool life up to 300% over non-leaded alloys in the same carbon range. For more details about these demonstrations, and for many other case studies, call Ryerson—where the nation's largest stocks of leaded carbon and alloy steels are available for immediate shipment.

New Fluid Power Tubing

Another development highlighted at the Machine Tool Show is the tremendous increase in hydraulic power applications. And because of this increase, the new Ryerson stocks of light-wall, pump-cylinder finish cold-drawn WELDED tubing should be of interest to a widening group. The special smooth I.D. of this welded tubing often makes it suitable for use "as-is" in place of more expensive types of tubing which still require extra finishing operations. Also in Ryerson stocks for hydraulic applications: Rockrite cylinder finish tubing and hydraulic fluid line tubing.

New Look for Steel Walls

Give steel-walled buildings new beauty with stainless steel siding in mansard pattern, now available for quick shipment from Ryerson. (Galvanized and carbon steel sheets are also available in mansard pattern.) Unusually attractive, economical in total area lost from pattern formation, maintenance-free stainless in mansard pattern also has many industrial and miscellaneous architectural ornamental applications. For new bulletin 70-5, write Ryerson, Box 8000-A, Chicago 80.

Aircraft Steels Specs

Just off the press, a new booklet entitled "Aircraft Steels" contains latest information, in condensed form, on Aeronautical Specifications—Military (MIL), Air Force-Navy (AN), Federal (QQ-S) and AMS aircraft quality steels. Also included is a complete listing of aircraft quality alloy and stainless steels available for quick shipment from Ryerson. To get your copy write Ryerson, Box 8000-A, Chicago 80, for booklet 93.



Biggest Stainless Plates

Now available from Ryerson stocks: 96" wide plates in thicknesses up through 1", and heavier plates in 80" widths. Types on hand: 304, 304L, 316, 316L. Save welding on next big job with these larger plates.

Carbon Bars, Plates, Shapes

Heavy demand is keeping supply out of balance from a size standpoint. However, we have thousands of tons of steel on hand and new tonnage being received daily. Ryerson stocks remain the world's largest and most diversified.

Joseph T. Ryerson & Son, Inc.

call
Ryerson
for ...

STEEL

every kind

in stock

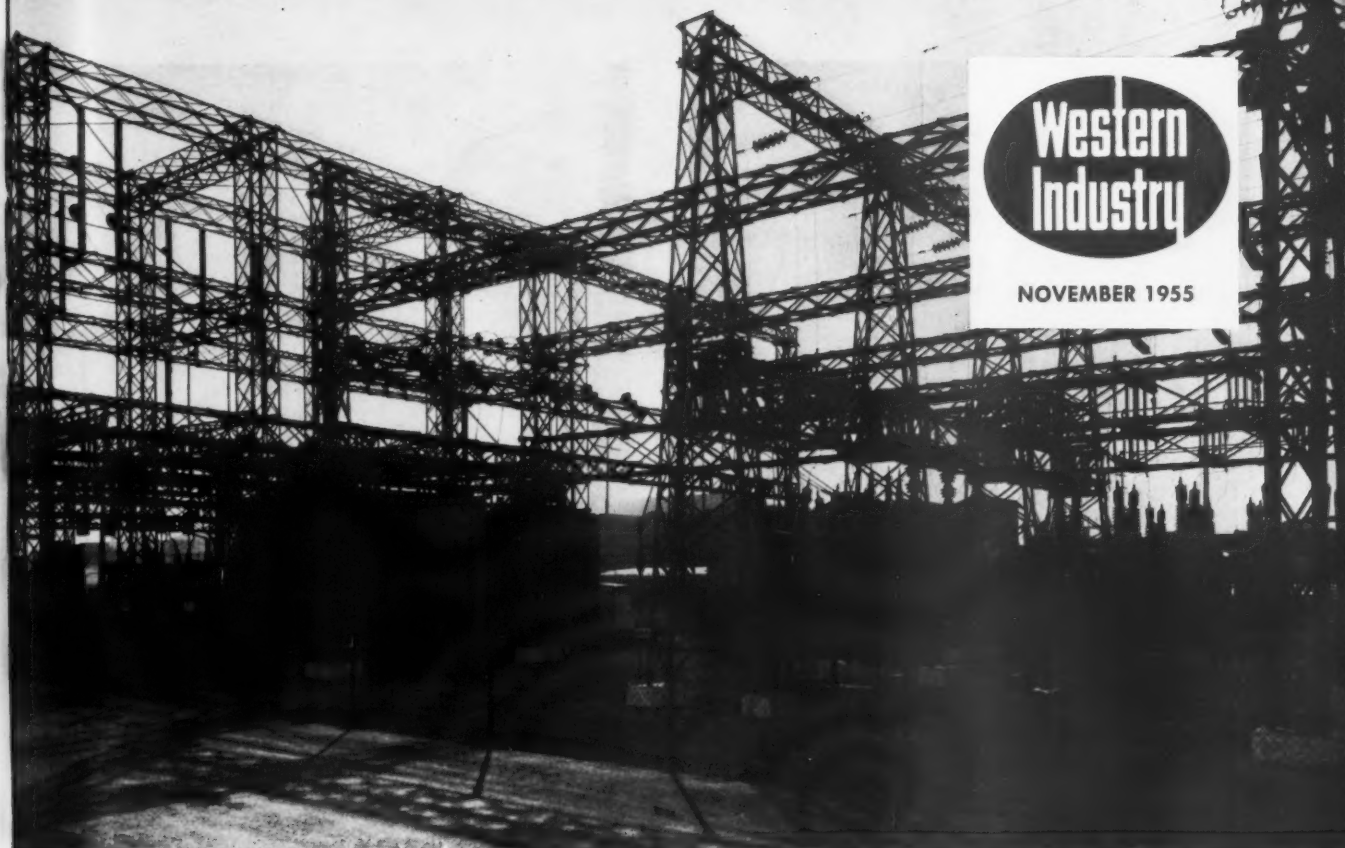
FOR IMMEDIATE SHIPMENT

CARBON, ALLOY AND STAINLESS STEELS
BARS • STRUCTURALS • PLATES • TUBING
SHEETS & STRIP • REINFORCING STEELS
ALSO MACHINERY & TOOLS • PLASTIC PIPE
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Plants at: New York • Boston • Philadelphia
Charlotte, N. C. • Cincinnati • Cleveland
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... for more details, circle No. 31 on Reader Service Postcard
WESTERN INDUSTRY — November 1955



From the company-owned 60,000-kva. outdoor substation (above) to the smallest controlling device, electrical equipment performance is vital to production at Bethlehem Pacific's L.A. plant. That's why plant engineers there try hard to attain . . .

Failure-proof electrical upkeep

. . . for transformers, air circuit breakers, d.c. motors, and controls.

THE capacity of a steel plant is based on continuous operation of its melting furnaces and the heavy equipment in its rolling mills. And, the operation of this equipment is dependent in turn on the efficient functioning of several hundred electrical devices and motors. The failure of any one device can stop an entire key operation and cut production seriously.

That's why Bethlehem Pacific's Los Angeles plant places so much emphasis on having a well trained maintenance force that takes care of electrical equipment in a manner not permitting incomplete or irregular inspections and repairs. At the request of WESTERN INDUSTRY's editors for details of this program, here's the story of how it's done.

A quick picture of the compact and efficient steelmaking and finishing facilities at Bethlehem's Los Angeles

plant and the electrical equipment required is as follows:

To attain an annual ingot capacity at Los Angeles of 402,000 tons, steel is melted in one 50-ton and two 75-ton capacity electric arc furnaces. The furnaces are served by 15,000-, 18,750- and 25,000-kva. transformers from a 6,600-v. plant bus, with the highest electrode voltage phase-to-

phase of 450. The plant has its own 60,000-kva. company-owned substation which steps down the power company service voltage from 66,000 to 6,600. Maximum power demand is 58,000 kw., of which 46,000 kw. is electric furnace demand. Power consumed monthly is 24,000,000 kwh., three-fourths of which is consumed by the electric furnaces.

Steel ingots are rolled through a 32-in. blooming mill driven by a 3,000-hp. reversing d.c. motor controlled by the Ward Leonard method. From the blooming mill, steel is rolled into billets through a three-high constant speed 22-in. mill powered by a 1,500-hp. wound rotor induction motor.

Two finishing mills roll billets into a wide range of products, including coiled rods, bars, flats, and structural shapes. The 12-in. finishing mill includes two 1,500 hp. wound rotor in-

AUTHOR OF THIS ARTICLE



C. C. BRANDT
Superintendent,
Electrical Dept.,
Los Angeles Plant,
Bethlehem Pacific
Coast Steel Corp.



INSTALLING SPARE ARMATURE during mill down turn to avoid any interference with production schedules.



ADJUSTING CONTACT PRESSURE of 13.8 kv., 2,000-amp. air circuit breaker on a 75-ton electric furnace.

duction motors, each of which has speed control above and below synchronous speed by the speed regulating system. There are 20 stands in the 10-in. continuous rod and bar mill driven by a total of nine 600-v. variable speed d.c. motors with a combined rating of 5,200 hp. Other production facilities are mill finishing, wire drawing, and bolt and nut manufacturing.

MAINTENANCE GEARED TO OPERATING SCHEDULES

The high cost of delays to the operation provides the key to the maintenance program. This cost is made up of overhead, operating cost, repair cost, heat loss, and loss of profit. Having a furnace out of operation can curtail the output of each of the rolling mills. It is necessary, therefore, to give particular attention to the maintenance of critical equipment on arc furnaces and rolling mills.

Loss of production caused by equipment failure is usually more costly than the cost of repairing the equipment. A large d.c. motor overspeed switch, a transformer high temperature alarm, or low oil level alarm might be called on to perform their functions only once in twenty years. But if a single equipment failure is eliminated, savings might be over \$100,000. For this reason, a regular recorded periodic inspection by specially trained personnel is required on

all critical equipment at the plant.

The cost of repair is kept to a minimum by good supervision, good quality workmanship, use of proper materials, and selection of the right time to make repairs.

For a maintenance program such as Bethlehem's to be successful, it must satisfy the needs of the operating departments. Frequent short interruptions of service by troublesome equipment can also affect production by lowering the morale of production workers. Production can be affected if the maintenance department does not promptly make changes and improvements in equipment that are requested by the operating departments. Small improvements, such as the relocation of master switches in a mill operator's pulpit, the installation of signal devices, and upkeep of means of communication, can have an important effect on production.

COMPLETE SPARE MOTORS GO IN DURING DOWN TURN

In rolling mills there are many motors of from 100 to 150 hp. driving mill auxiliary equipment. The failure of any of these motors could stop the operation of an entire mill. Complete spare motors for these hard service mill drives are considered a necessity to keep production delays to a minimum. Spares also have the effect of making maintenance easier by remov-

ing some of the pressure from the maintenance people. A spare motor can be changed during a mill down turn and complete repairs made to the spare while the mill is operating.

Selection of equipment as to type and application has a tremendous effect on the maintenance program. If the operation of a mill is dependent upon the successful operation of several hundred electrical devices and motors, and the failure of any one device can stop the entire mill operation, the possibility of delays is greatly reduced by having good, dependable electrical equipment throughout the mill.

RUGGED D.C. MOTORS SATISFY HEAVY NEEDS

The steel industry has practically standardized on the use of 230-v. d.c. mill-type motors for mill auxiliary equipment involving reversing or frequent starting and stopping. In this class of equipment are overhead cranes, roller lines, manipulators, side guards, furnace pushers, etc., where heavy loads must be quickly accelerated, decelerated, and reversed. Most of the motors used are series wound, although some compound wound and a few shunt wound motors may be used for lightly loaded or constant and variable speed drives.

Control for the AISE mill-type motors is equally as rugged as the



CHECKING D.C. CONTROLLER as part of regular maintenance program, "mechanical horse sense" is needed.



CHECKING CONTACT WIPE on d.c. contactor. Grasping incorrectly indicates wipe where none actually exists.

motors, with controls classified as "Steel Mill Type" and built to NEMA standards. Cabinets have extra heavy steel throughout. Contactors are built for snappy operation and from 100,000 to several million trouble-free operations without changing contacts.

"HORSE SENSE" IN UPKEEP OF D.C. MILL EQUIPMENT

Here are tips on maintenance of d.c. controllers by a practical electrician at the plant who has many years of steel mill experience:

"On the general run of d.c. mill equipment, a man with what I would call mechanical horse sense can accomplish an excellent job without wide technical knowledge. It is my belief that the man who tries to rely too much on theory and technical knowledge, on the average, is slow in getting equipment back in service due to the fact that he must work with a blueprint and instruments, which usually involves disconnecting and other time-consuming operations that for the majority of cases prove unnecessary. In other words, a man with a basic knowledge of equipment and good visual alertness can usually locate faults readily.

"For instance, on straight reversing and accelerating panels, when failure occurs, a quick survey of contactors and relays to see that they are free and have sufficient wipe, and when the

operation of panel with power on shows none are on contactor tips, the chances are the fault is between panel and motor, and a quick survey of back of panel, resistance leads, and motor leads will ordinarily locate the fault.

"Of course, as you become involved in more complicated controls, more reliance on circuit schematics and instruments for testing is necessary.

COMMON MISTAKES WITH CONTACTORS AND RELAYS

"In regard to the general maintenance of d.c. contactors and relays, one mistake that four out of five men will make unless otherwise instructed is in testing the wipe of contacts on pivot type contactors. They will grasp the most easily accessible part of the contactor, which is the top, and close the contactor. On a pin type contactor, if undue wear of pins and bushings has not occurred, this may be all right, but due to the necessary clearance at pivot point of pivot type contactors, unless the armature is grasped by the back and moved against the coil core as normal operation occurs, wipe is indicated where actually, under power operation, no wipe exists.

"Another mistake commonly made is that regardless of the amount of wipe present, when contacts look worn and uneven they are changed. Actually where good wipe is still present, much longer operation of contacts is

possible. Still another mistake comes in doing what all manufacturers warn against—using a file to smooth contacts. Unless contacts are removed from the contactor, placed in a vise, and draw-filed, a file should never be used, as this procedure destroys contact surface and makes for trouble. In general, if a contactor has good wiping action and does not have a glossy bubble developed on it from extreme arcing, it should be left alone.

"In general, good maintenance on equipment means keeping panels and control parts clean, component parts tight, and when trouble does occur, not just replacing a fuse or resetting an overload but trying instead to determine immediately why such fault occurred. If a fault occurs once it will in all probability occur again, even though at the moment everything seems normal. The average man can, by a little diligent brain work and basic knowledge of the circuit involved, usually pinpoint the possible cause of any erratic action and, by correcting it at the earliest opportunity, forestall future failure of equipment."

OVERWORKED BREAKERS NEED SPECIAL CARE

Large air circuit breakers used for switching power on and off electric furnace transformers in our plant, although used on 6,600 v., are rated 13.8 kv. Ampere ratings are 1,200 on

... concluded on page 103

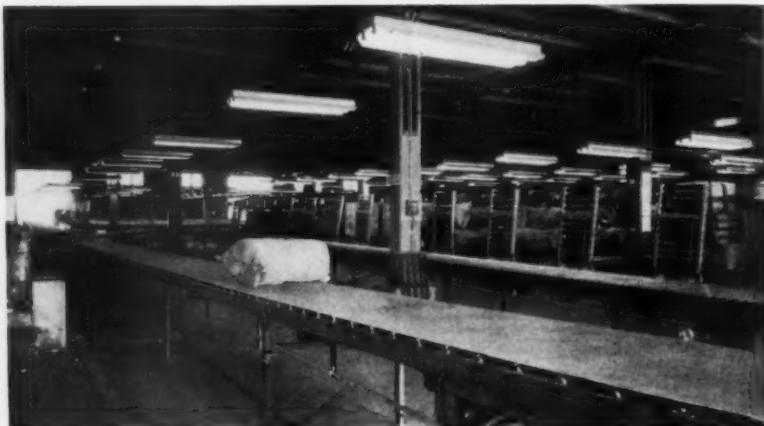
Speedy, automatic handling

... with this steady-flow system of roller and belt conveyors, segregators, air tube message carriers, and teletypewriters, as Maywood AFB keeps pace with accelerating air delivery schedules.

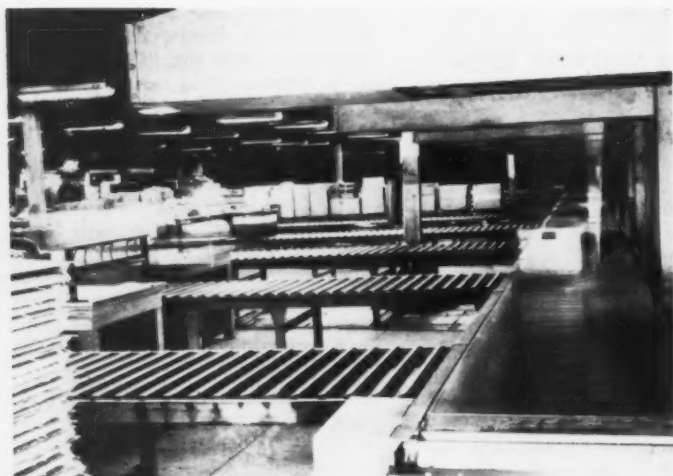
WITH today's speeded-up transportation facilities and slashes that have been accomplished in time-distance comes the problem of meeting orders faster. For example, Maywood Air Force Depot in Southern California recently found that its existing system was not keeping up with advanced air delivery facilities.

Mechanization of the depot was needed to maintain efficient supply of materials to units in the West and overseas. Obtaining it became a matter which was tagged Project Greenlog. Now, electrical transmission of supply requests via teletypewriter permits direct printing of requisitions transmitted from depot to depot.

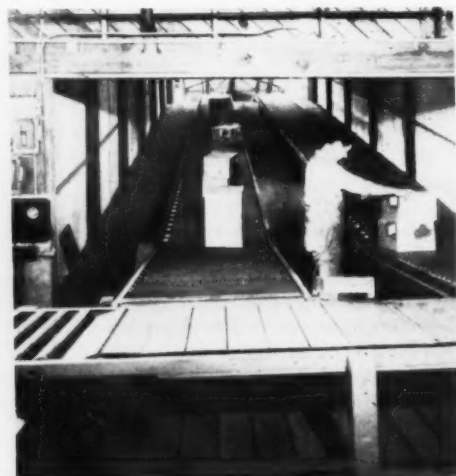
Belt and roller conveyors, pneumatic tube message systems, and other equipment were also installed and personnel trained to operate them. Once material is unloaded from the trucks and placed upon the first conveyor, it remains on conveyors until it has been completely processed and is ready for storage. It all starts in ...



1 **CENTRAL RECEIVING**, where materials are immediately loaded onto belt or roller conveyors from unloading rail cars and trucks. The entire system has been designed following a production concept of bringing the work to the people in a steady flow, thus avoiding shifting of personnel to various locations where, without this production concept, material would be stacked. The entire receiving operation takes place under one roof through use of the conveyors and efficient distribution of manpower. First, the materials are delivered by a selective conveyor to the correct roller conveyor in ...



4 **TEN-STATION AUTOMATIC SELECTOR SYSTEM** accomplishes automatic segregation of items for required packaging as determined by a central control station. Packages must be prepared for several types of shipment—parcel post, domestic pack, overseas pack, and consolidated shipments. Automatic segregation of the items has speeded up the overall order processing time greatly. Once packaged, items start the outbound journey via a ...



5 **MECHANICAL CONVEYOR BRIDGE**, which consists of an overhead tunnel joining the packaging warehouse to the transportation building. Within the tunnel are two powered belt conveyors. Materials arriving in the transportation building are mechanically separated by a system comprised of a ...



2 INSPECTION, for thorough checking and identification. Then the items are treated to prevent corrosion, and separated into property classification groups. In conjunction with obtaining more production by use of conveyors, a mechanized waste extractor system—designed to suck up waste-paper—is in operation. Next stop is . . .



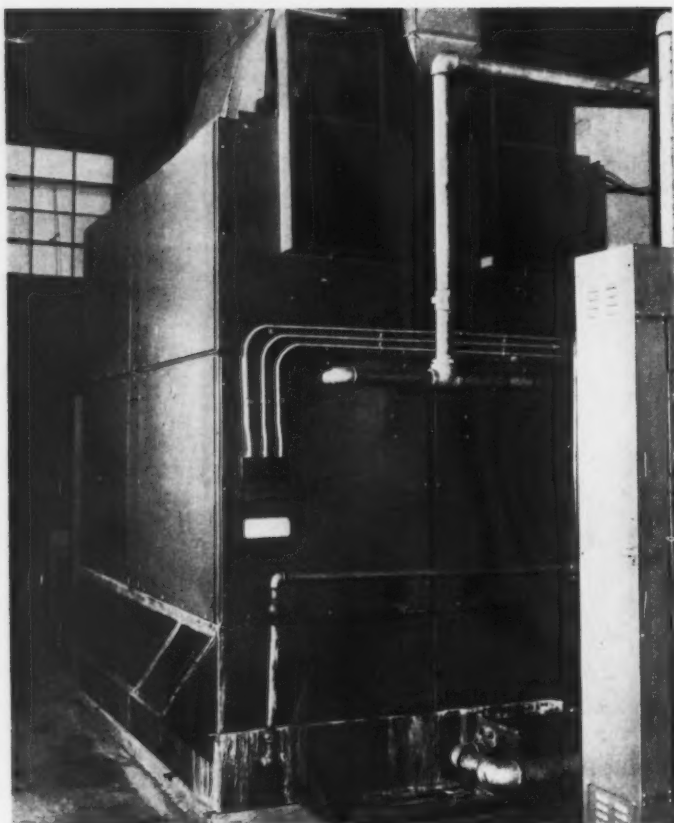
3 PACKAGING, where approximately 7,000 packages are handled daily for shipment to locations in the Western United States, Alaska, Hawaii, and the Far East. Here, materials selected for shipment are received via conveyor, and type of package and method of shipment are determined by auto-mechanical conveyor lines. Then a . . .



6 SIX-STATION AUTO-SELECTOR, which diverts each shipment to the desired conveyor line loading directly to a pre-spotted truck, van, or railroad car. This direct loading—eliminating time consumed in baying freight and later relocating material in load lots—has also stepped up the operation considerably. Such accelerated mechanization of materials handling demanded similar acceleration in handling of paper work. So a . . .



7 PNEUMATIC TUBE SYSTEM was installed. Vacuum tube, 4 in. in diameter, connects 23 stations in 4 buildings. Any station can send messages or small items to any one of the other stations. Documents take less than 60 seconds to travel from one end of the tube system to the other.



IN A BIG WAY . . . Solar plant engineers have gone to a system of cooling towers for recirculation of cooling water used in welding and heat treating operations (saving to date 8,000,000 gal. per month). Above, one of a series of Worthington towers installed in various sizes and capacities.



IN LITTLE WAYS . . . Solar maintenance men determined possible water savings from installing tanks and pumps at individual welding units to recirculate water. Here, special tank set-up at a roll welder.

Saving plant water saves \$\$\$

WATER can be a major utility expense in any manufacturing plant, particularly in the West. Effective use of water recirculation systems can reduce consumption appreciably, and drive water costs down. Here are the first two chapters in the story of how Solar Aircraft Co. is making efforts to reduce its 300,000,000 gal. per year consumption and \$70,000 per year water bill.

Growth creates the problem

At Solar, as has been the case at almost all Southern California industrial plants, growth has been rapid in the postwar period. The technological problems of manufacturing highly complicated precision parts for modern aircraft engines and other products made from high alloy steels has necessitated the acquisition of large

numbers of welding and heat treating facilities. These use enormous quantities of cooling water.

At first it was apparent that it would be necessary to employ systems for the recirculation of water for welding equipment, the largest users of cooling water. This was done by add-

ing tanks and pumps, designed by the plant engineering staff, to individual units for recirculatory purposes. Here, due to the nonstatic and diversified type of operation to which this equipment was put, it was not possible to install a central system, which would have been more desirable. This initial attempt at saving water was installed on some 50 welding units using approximately 3 gpm. per unit. Water savings of 2,000,000 gal. of water a month resulted. In dollar saving, this was some \$300 per month.

Success, so program expanded

Since our initial attempt at water conservation proved so successful, Solar has embarked on a long-range program of water conservation and reduction of dollar costs caused by the large consumption of water for cool-

AUTHOR OF THIS ARTICLE



DELL A. WOLFINGTON, SR.

Chief Plant Engineer,
Solar Aircraft Co.,
San Diego, Calif.

ing purposes. This is being brought about by installing cooling towers for the recirculation of water in compressors (plant-wide compressed air supply) which use approximately 4,000,000 gal. of water each month, and the heat treating furnaces which use approximately 6,000,000 gal. a month. Added to welding equipment consumption, these units make up just under 30% of the total water bill, currently averaging some \$6,000 per month based on a total consumption of nearly 25,000,000 gal. per month.

Steel cooling towers selected

The type of equipment for recirculating cooling water was decided on after a study of the mechanical features maintenance requirements, size and capacities of the various cooling towers manufactured. Tower model selected was the Worthington CTZ series with capacities ranging from 7 to 70 tons of refrigeration and a realization factor of 90% water savings. This all-steel induced-draft type of tower can be installed inside or out and on any level and requires minimum alteration of the existing water cooled system.

Typical examples of the economics of recirculating cooling water in connection with some of the equipment which use large quantities, can be seen by the following figures:

AIR COMPRESSORS (5 machines totaling 1,050 hp. approximately 5,250 cfm.)

Estimated equipment cost installed	\$15,000
Water savings per month	4,350,000 gal.
Dollar savings per month	\$1,200
Maintenance and other costs per month	\$450
Actual savings per month	\$750

ELECTRIC HEAT TREATING FURNACES (2 units totaling 660 kw.)

Estimated equipment cost installed	\$15,000
Water savings	4,000,000 gal.
Dollar savings	\$1,066
Maintenance and other costs per month	\$342
Actual savings per month	\$724

More cooling towers?

In the projected program of water conservation Solar is currently studying possibilities of installing CTZ induced draft cooling towers in central areas of the plant where resistance welders are concentrated so that one large tower can recirculate the cooling water of from 3 to 20 welding units by means of a manifold system and common sump from which water is pumped back to the tower.



In a remarkably trouble-free and unique materials handling application, helical fighting carries hot and heavy uranium ore uphill from the roasters in one building to the ball mill in another through these plant-fabricated . . .

Revolving-case screw conveyors

USING revolving-case screw conveyors to transport bulk matter is a means of materials handling with a reasonable initial cost and which requires very little maintenance. Vitro Uranium Co. at Salt Lake City uses three such conveyors to transport roaster calcines between buildings. Oldest of the three has handled over 100,000 tons of the uranium ore and, other than routine bearing replacements, has shown no wear up to the present date.

The uranium ore handled weighs about 100 lb. per cu. ft. It is discharged from each of three multiple hearth roasters at a temperature of approximately 550 deg. F. in a crushed form of about minus 10 mesh.

Fabricated at the plant

Conveyors are fabricated from 12-ft. lengths of standard 12-in. I.P.S. pipe with 12-in. flights of 1/4-in. steel mounted on 2 1/2-in. standard pipe and welded to the inside of the casing at each end. Pipe sections are then joined by means of 12-in. steel, slip-on flanges to make up the required length conveyor. Lengths of the three in use at Vitro vary from 58 to 84 ft., with rising pitches varying from 4 to 10 deg.

Screw capacity, of course, depends on speed as well as size. These conveyors are rated at 6.5 tons per hour at 26 rpm. They have been operated

at speeds as high as 40 rpm., but 30 rpm. seems to be the top speed with maintenance-free operation.

Special trunnion bearings

Vitro has found it necessary to design and fabricate its own bearings for the screw conveyors due to the high temperature of the material handled. Bearings are of the trunnion type; 6-in. rolls fabricated from 7-in. lengths of 6-in. cold rolled shafting. They are bored to receive a fixed shaft and double race ball bearing at either end and roll on shoes, made of heavy duty 12-in. pipe couplings with the thread bored out, welded to the pipe casing.

Bearing sets are located at either side of the drive sprockets and at about 20-ft. intervals beyond that point. Properly lubricated, bearings have a life of about 10,000 operating hours.

Driven by gearmotors

The conveyors are driven by gearmotors through roller-chain sprockets. Horsepower of the drives is from 5 to 7 1/2, varying with capacity, pitch, length, etc., of the conveyor.

This description of Vitro's unusual solution of a materials handling problem has been supplied by R. C. Cole, plant manager of the Salt Lake City mill, and his staff.

Would YOU
like to be
head of your
department,
division, plant,
or company?
Then take a
look at ...

How your boss got there!

THIS article gives you many nuggets of personal advice on how to get to the top. They come straight from thoughtful and analytical minds of men and women who gained executive posts—who have gone through the mill and achieved positions of leadership and responsibility such as the one on which you have your heart set.

Results of a survey covering 41 executives' description of their own means to success, actually 46 executive positions are represented because some persons reported on two different positions.

Positions reported on are mostly middle management. Only a few are top management.

Retrospect and prospect may differ greatly in this business of going up the leadership ladder. This survey included only those who had arrived at the top. If a survey were taken to get a full report on those who had not arrived at the top, the fact that many of them had done all of these success producing things but still had not gained the promotion desired would probably be revealed.

In other words, there is no guarantee of executive status if you do these things. The target is a very small one. To hit the bull's eye and reach the top is not easy.

AUTHOR OF THIS ARTICLE



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Ernest L. Loen &
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Management
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Los Angeles

Dr. Crawford, who has served 29 years as a full professor at the University of Southern California, recently began a one-year leave of absence from that position to devote full time as a research director for the management consulting firm of Ernest L. Loen and Assoc. He has authored some 100 publications, including 15 major textbooks.

Table 1
HOW I PREPARED MYSELF

Times mentioned	Method of self-preparation for the higher job
22	I became a good technician or skilled performer.
17	I informed myself, could answer questions.
13	I took training courses.
11	I got experience in related kinds of work.
9	I studied other jobs besides my own.
9	I sought, collected, or pooled the ideas of others.
7	I worked outside my job classification.
7	I got off-the-job experience and contacts.
4	I practiced job rotation.
2	I got expert advice when I didn't know.
101	Total methods mentioned, for 46 executive positions.

FIRST, IT TOOK PREPARATION

How these successful leaders trained or developed themselves so as to be ready for promotion is shown in the table above. It is, in a sense, a summary of "how to study" for your coveted executive post.

Note that the first three methods account for half of the total, and that they are centered on rather definite and systematic preparation. Perform-

ance skills lead, and are followed by job information and organized job training, in that order. Then follow eight miscellaneous methods, with steadily decreasing frequencies.

Whether the methods reported would be best for you or not is an open question. Training opportunities are improving every year. You may need to make more use of systematic training for executive leadership than did those who now hold such posts, because competition is getting more intense, and the demands or requirements are becoming more and more exacting.

You may especially need to give more effort to specific training for executive leadership as such than did those covered in this survey, because company after company has discovered that technical skill and leadership skill are two very different qualities, and that the best technician is often a poor executive.

Table 2
HOW I GAINED RECOGNITION OR WAS SELECTED

Times mentioned	Method of gaining recognition
41	I practiced good personal, human, and public relations.
30	I worked up, grew into large responsibilities.
20	I worked hard, did more than required to do.
20	I accepted and bore responsibility.
14	I was loyal, had cooperative attitude.
12	I suggested or made improvements in methods.
10	I sought, applied for, or expressed a desire for promotion.
10	I did more thinking, planning, or analyzing than others.
7	I used pull, cultivated those in power.
6	I delegated duties, directed others in doing them.
5	I capitalized on the weakness or incompetence of those above me.
4	I was patient, waited my time for promotion.
4	I spoke up, asserted myself, said what I thought.
4	I helped others.
4	I took and passed promotional examinations.
2	I distinguished myself in committee assignments.
2	I volunteered to do things.
2	I worked cheaply, priced myself low at first.
207	Total methods mentioned, for 46 executive positions.

THEN, IT TOOK RECOGNITION

This table illustrates how these successful persons got their chance, were chosen, or achieved actual promotion to the executive posts which they now hold.

If you add all those methods which have a social or human relations element in them, you will see that almost half the mentions have some sort of human relations slant. Perhaps this is another way of saying that leadership posts are gained by "politics," but a more charitable statement would be that they are gained because of leadership ability. The "politics" approach was admitted by seven, who frankly say they used "pull."

The unsuccessful candidates for promotion would raise this estimate considerably because of a "sour grapes" defense mechanism. But let's face the basic fact involved: Leading people actually does require social skills of a high order, and mere technical performance on the job does not guarantee you those social skills. You will probably have to study and cultivate them, or let someone else go

into the leadership spot in your place.

Some of the 41 human relations skills mentioned in the first group of items are neatness, friendliness, sociability, fairness, listening to both sides of an argument, sincerity, politeness, control of temper, speaking ability, liking for others, and modesty.

Adding together all the frequencies of mention of the items of the other general type gives us about another 50% that stress action, competence, getting things done, hard work, and efficiency. As these executives see themselves, therefore, their recognition and promotion was based about half on social competence and the other half on work competence and work output.

Note the frequency of hard work, bearing responsibility, thinking, planning, and earning the next step up by working upward in the present job. It appears that the energy level of these people was an important factor in their advancement. An executive's life is not one for a lazy person, either before or after the position has been won.

HOW YOU MAY BE SELECTED

*... as told by
Industrial Psychology, Inc.,
Tucson, Ariz.*

A look at some advice to management in regard to selecting trainees for advancement will show you something of the preparation required for getting ahead.

Industrial Psychology, Inc., reports that there are four areas to be watched carefully when selecting trainees for higher positions:

1. Recruitment: It costs four to five dollars to recruit and screen an applicant for training properly. This amount is small when compared to the thousands of dollars involved in training the wrong man.

Recruiting should be carried out both in the company and outside, with some weight given to company service in the trainee selection.

2. Brainpower: A higher-than-average IQ, logical thinking, sound judgment, ability to foresee, plan and organize, and creative imagination are intelligence factors needed by a good leader. Lacking them, the supervisor is almost certain to be slow to learn, and his work punctuated by mistakes and bad judgment. It takes about one-half hour to test a person on these supervisory aptitudes. If he falls below a certain point, he would be a definite intellectual risk for trainee status.

3. Personality: Traits in this respect usually associated with leadership include an adventurous outlook, dynamic ability to face wear and tear in dealing with people and grueling emotional situations, and self-confidence. A leader should not be a worrier or brooder. He should be sociable. He has strong control of his emotions, is inclined to be considerate, careful, and conscientious. However, leaders are sometimes inclined to be obstinate.

Also the leader is usually consistent, planful, energetic, cautious, well-organized, and has a high regard for moral standards.

4. Biography: What the applicant has done in the past is a good indication of what he will do as a trainee for advancement. Factors entering into background considerations are job stability, job experience, educational background, financial maturity, health and physical condition, family background, domestic situation, and outside activities.



PREVENTIVE MAINTENANCE is done on year-around basis, here on feed water pumps at high pressure plant.



FLUE GAS ANALYSIS being made by an operator at heating plant which serves the Los Alamos town center.

Efficient steam plant care

It's difficult when plants are scattered and water carries corrosive elements, but Zia shows how for the AEC at Los Alamos.

ONE task of the Zia Co.—performing services necessary to the support of the Los Alamos Community and Los Alamos scientific laboratory of the University of California—includes the maintenance of steam equipment widely diversified in both type and location.

This is done by the utilities division of Zia Co., which consists of five sections: power distribution, power plants, power and systems dispatch, water, gas, and sewage, and steam plants. The crew maintaining the steam plants consists of a superintendent, his assistant, four foremen, and 32 engineers and firemen.

The four major steam plants in operation in this New Mexico establishment each serve a large technical or town area and operate 24 hr. a day. Three of these are medium pressure plants, ranging in pressure from 15 to 100 psi. Another plant serves the town center and is centrally located.

There is one high pressure plant. Each of these plants and its area com-

pares closely to an industrial plant of similar size.

Roving inspectors

Several small plants, scattered throughout the Los Alamos area, present a travel problem to the maintenance crews. They are typical building heating systems with as high as three boilers in one plant. Automatically operated, they need only be checked once every four hours by two crews of roving operators who drive

between 350 and 400 miles every 24-hr. period.

All of the major plants have automatic combustion, feedwater, and makeup water controls, each plant having different makes and types of controls. Most of the combustion controls are of the off-on type; the remainder are of the modulating type.

Natural gas is the main fuel and is burned in all plants served by the gas distribution system. Some of the small plants, due to their isolated location, burn oil. Oil standbys are provided in all of the major plants. The three medium pressure plants are equipped with fire tube boilers.

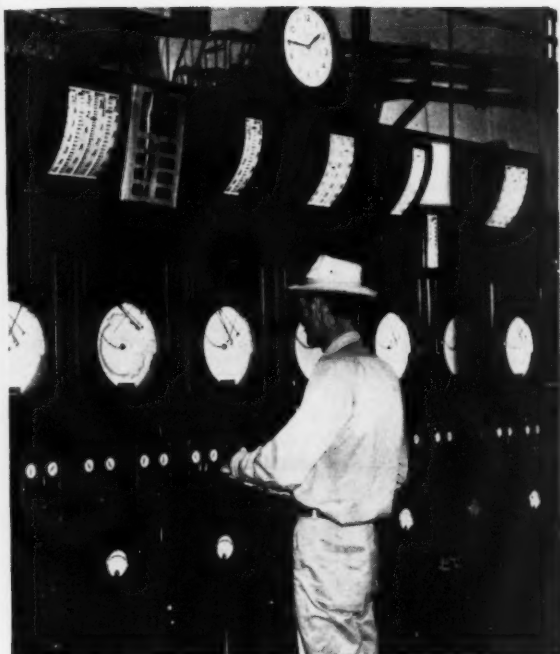
WHO DOES IT—AND WHEN?

Plant maintenance in all but the high pressure plant is done by the operating personnel with an occasional assist from the high pressure plant mechanic. Repairs requiring replacement of pipe or major equipment are done by the fitters or other appro-

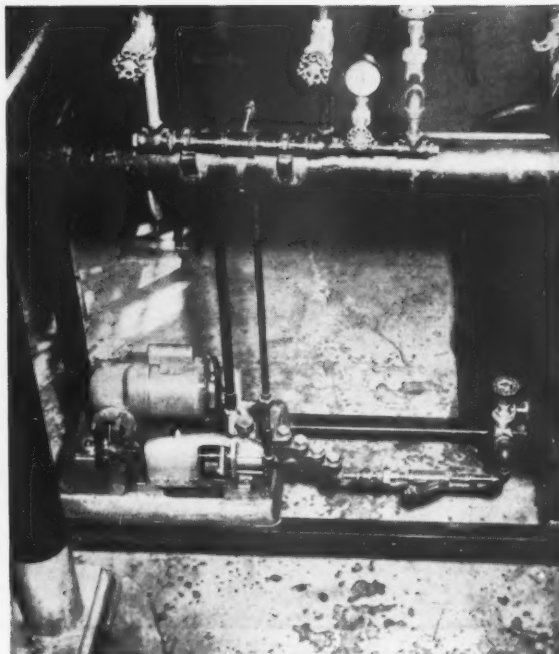
AUTHOR OF THIS ARTICLE

GUY J. ELDER
Superintendent
of Steam Plants,
The Zia Co.,
Los Alamos, N. M.





CONTROL BOARD at 100 psi. plant. Combustion controls are of the off-on type; others are modulating type.



FILMING AMINE protects condensate lines against corrosion. Here are pump and tank that mix and store it.

priate craft on a work order requested by steam plant supervisors.

The fire tube and cast iron sectional boilers are cleaned and washed thoroughly during the summer when most of the plants are shut down. Other preventive maintenance such as furnace repairs is also done at this

time. A thorough internal inspection is made of all boilers during July or August.

Maintenance of other equipment such as pumps, feedwater and other regulators, meters, and controls is done on a preventive basis as far as possible. Oiling and greasing is scheduled. Once each year the plants are shut down to pack line valves and make other repairs which require a shutdown. This work is coordinated with departments responsible for the outside systems so that one shutdown a year is usually sufficient.

CORROSION CONTROL EXCEPTIONALLY DIFFICULT

An average water analysis in the Los Alamos area shows the following content:

Calcium hardness.....	35 ppm.
Total hardness.....	35 ppm.
Magnesium hardness....	0 ppm.
Phenol alkalinity.....	9 ppm.
Methyl alkalinity.....	128 ppm.
Chlorides.....	14 ppm.
Sulfates.....	9 ppm.
Silica.....	36 ppm.
Phosphate.....	0 ppm.
Iron.....	0.13 ppm.
pH value.....	8.4

All steam boilers are treated with phosphate and tannin and in the high pressure plant sulfite is added. The control tests are all run by one man in a central water laboratory.

During heavy rains, when the pH value of the raw water approaches acidity, small amounts of sodium hy-

droxide are used for alkalinity control. Results have been very satisfactory.

Return lines protected

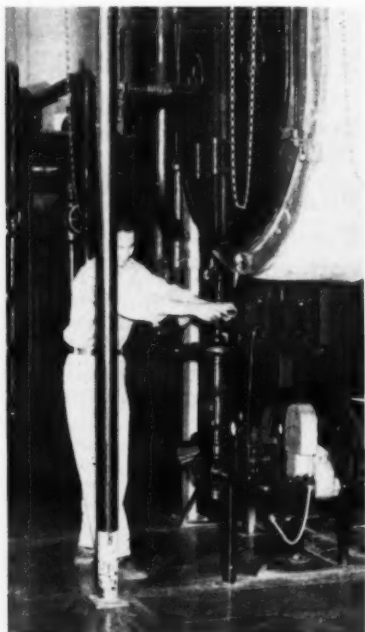
The high proportion of bicarbonates in the raw water forms carbon dioxide when the water is evaporated and in turn makes carbonic acid in the condensate. This has caused considerable trouble from return line corrosion.

Since 1950, filming amine feeding, which forms a thin protective coating on the entire return system, has been practiced.

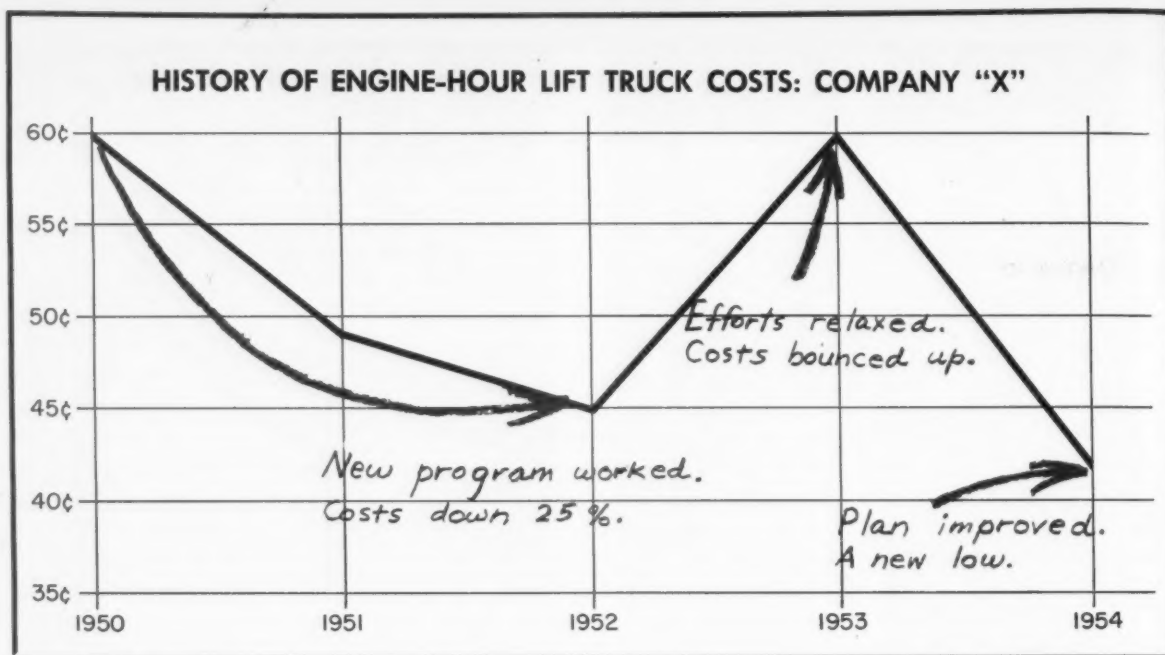
Two kinds of amine are in use. One is fed directly into the boiler with the feedwater and goes into suspension there. The other is introduced into the steam lines at the plant. The latter gives somewhat better results.

Weighed steel specimens are installed in the return system. These are removed monthly and checked for loss to determine the protection resulting from the amine and the feed required. About 90% of the steam in these plants is returned. Condensate is collected in surge tanks and pumped through return systems to plants.

Tests show that the lines handling the returned steam receive better than 90% protection. Return line replacement has practically been eliminated where the water is treated and plans are being considered for the installation of equipment to treat the water in several smaller systems.



FIRE TUBE BOILER in heating and processing steam plant, showing a natural gas burner installation.



Lift truck costs reduced 30%

Analysis on individual truck basis was first step, followed by vigorous program to eliminate careless repair time reporting, poor equipment identification, and fallacious gas and oil use figures. A new look at repair vs. replacement question helped, too.

AUTHOR OF THIS ARTICLE



**LYLE W.
COUGHRAN**

Mr. Coughran is industrial engineering supervisor at a medium-size Western industrial plant where pioneer work has been done in ascertaining lift truck operating costs. The results speak for themselves—they should be helpful to other plants in finding out just what it costs to operate lift trucks and when to overhaul and replace them.

Prior to the year 1950 we accepted our monthly lift truck operating costs with little concern.

This was understandable, since we had no real concept of the number of hours our trucks actually operated each month. When costs were high, we assumed the operating hours were high. If costs were low, we felt good about it.

Late in 1949 a survey of our truck operating costs revealed a steady upward trend. Spot checks revealed careless reporting of repair time, erroneous identification of equipment, and improper reporting of gasoline and oil withdrawals.

In short, we had cost figures, but they were valueless on an individual truck basis.

To meet the situation, we finally agreed on a three-phase program, to accomplish the following:

1. Establish a common operating cost yardstick.
2. Improve the accuracy of reports.

3. Set up a cost reduction program based on preventive maintenance and replacement of worn-out equipment.

PHASE 1 Common operating cost yardstick

This was accomplished by installing engine-hour meters on all trucks and issuing monthly operating cost reports on an engine-hour basis. This phase was completed in the latter part of 1949.

PHASE 2 Improving accuracy of reports

This was strictly a psychological problem. We decided to create an active interest in cost control in order to obtain factual reporting.

We accomplished this by arranging for our auto mechanics to attend preventive maintenance sessions con-

ducted by vendors of our equipment. We invited them to attend dinner meetings and encouraged them to suggest cost reduction ideas which were acted upon without delay.

We held weekly meetings with our truck drivers, discussing such topics as safe driving practices, proper care of equipment, truck operating cost, etc.

We also encouraged them to air their gripes.

This program resulted in a \$3,000 reduction in truck operating costs during the first year. While the major share of this reduction was undoubtedly due to improved reporting, it was generally believed any future reduction would be a true cost reduction in our program.

Here is the history of Phase 2, covering the past five-year period:

IN 1950

... we operated 15 lift trucks a total of 35,102 engine hours, at an average cost of 60c per engine hour.

IN 1951

... seventeen lift trucks operated 42,144 engine hours, at an average cost of 49c per engine hour, an 11c cost reduction per engine hour. Total reduction of \$4,636.

OPERATIONS ANALYSIS: Lift trucks in typical month

Net operating hours					Net operating cost				
Truck No.	Purch. Date	For Month	Year to Date Total	Avg./Mo. Avg./Mo.	Avg./Net Oper. Hr. Previous Year	Avg./Net Oper. Hr. for Month	Year to Date Total Chgs.	Avg./Net Oper. Hr.	Avg./Net Oper. Hr. Previous Year
16	10-49	147	1,912	159	192	\$0.76	\$1,137	\$0.59	\$0.41
13	7-49	220	2,934	245	171	.41	1,905	.65	.51
14	7-49	186	3,053	254	164	.56	1,953	.64	.58
31	12-53	253	3,724	310	70	.41	1,110	.30	.66
18	10-50	96	1,281	107	347	.77	899	.70	.58
15	10-49	138	1,532	128	179	.72	1,191	.78	.98
23	5-52	149	1,895	158	172	.51	938	.49	.28
24	10-53	158	2,610	218	166	.65	937	.36	.35
22	5-52	134	1,784	149	179	.54	984	.55	.76
19	1-52	97	1,528	127	224	.49	503	.33	.71
25	10-53	160	1,799	150	147	.31	404	.22	.24
20	2-52	139	1,855	155	170	.54	762	.41	.29
28	12-53	123	1,713	143	43	.28	377	.22	.81
26	11-53	148	1,930	161	124	.55	504	.26	.41
27	12-53	166	2,060	172	125	.32	452	.22	.29
29	12-53	138	1,980	165	43	.40	416	.21	1.49
17	10-50	158	1,704	142	169	.46	704	.41	.36
30	12-53	164	1,793	149	63	.21	352	.20	.63
21	4-52	191	3,077	256	172	.47	1,463	.48	.31
Total all trucks		2,965	40,164	3,347	2,920		\$16,991		
Average per truck		156	2,114	176	201	\$0.48	\$ 894	\$0.42	\$0.60

IN 1952

... eighteen lift trucks operated 42,577 engine hours, at an average cost of 45c per engine hour, 15c less than in 1950. Compared to 1950, we had reduced our cost by \$6,387 per year.

IN 1953

... because we believed that the program had been sold and costs would level off at about 45c per engine hour, we relaxed our attention.

We had never been more wrong. At the end of 1953 our average cost per engine hour had risen to 60c. We were right back where we were in 1950.

IN 1954

... we again revived the interest of all concerned and came up with a new low at the end of 1954: an average cost of 42c per engine hour, an 18c reduction totaling \$7,230 per year.

The major share of this reduction was due to an analysis of 1953 operating costs, which resulted in replacing seven worn-out trucks. We also added one more unit to our fleet, bringing our total up to 19 trucks.

PHASE 3

Cost reduction through preventive maintenance and replacement of worn-out equipment

We consider four major factors in reducing costs by straight replacement of worn-out equipment.

1. Thoroughly analyze high operating costs.

2. Obtain cost estimates based on complete reconditioning.

3. Obtain price quotations on straight replacement basis.

COST ANALYSIS: Truck repair vs. replacement

Truck No.	12
Purchase date	July, 1950
Remaining useful life—current condition	None
Remaining useful life—after overhaul	2 years
Current trade-in value	\$ 500
Trade-in value—2 years hence	\$ 350
Reduced value per year	\$ 75
Overhaul cost—total	\$2,400
Overhaul cost—per year—next 2 years	\$1,200
Operating cost per engine hour—last 12 months	\$ 0.85
Estimated operating cost per engine hour after overhaul	\$ 0.50
Engine hours operated—last 12 months	2,250
Estimated operating cost per year—after overhaul	\$1,125
Original cost	\$5,000
Useful life—present condition	5 years
Useful life—after overhaul	7 years
Depreciation rate per annum	\$ 714
Total level cost per year to maintain existing equipment	\$3,114
Replacement cost	\$5,500
Estimated useful life	5 years
Depreciation rate per annum	\$1,100
Estimated operating cost per engine hour	\$ 0.42
Operating cost per year	\$ 945
Total level cost per year—replacement basis	\$2,045
Estimated annual saving	\$1,069
Added investment (\$5,500 minus \$2,400)	\$3,100
Percent return on added investment	34%

4. Determine percent return on added investment.

The accompanying analysis of lift truck operations serves as our barometer, as age and operating costs are closely watched to hold costs in line. When these two items indicate potential cost reduction by replacement in kind, cost estimates for thorough overhaul of the equipment are obtained.

Our next move is to obtain price quotations on equipment in kind, from which we deduct the cost of overhauling present equipment. The result represents our added investment.

Let us assume the current required rate of return on added investment is 15% before taxes; that is to say, the added investment must be returned in less than seven years.

The table "Cost Analysis—Repair vs. Replacement," shows an example of a potential cost reduction of \$1,069 per year and a return on added investment totaling 34%. Approval of an appropriation request on this basis would be granted in most instances without further questioning.

In this case, the truck has no remaining useful life in its current condition, as it has failed and a major overhaul is required to return it to service.

Recondition or replace?

The question then becomes, "Should we recondition the truck or replace it?" As for remaining useful life after overhaul on trucks five years old or more, we consider two years to be a reasonable estimate based on past experience. Current trade-ins are usually based on previous or historical salvage values. The same is true when life is extended two years through major overhaul.

Overhaul cost here is listed at \$2,400, which on the basis of a two-year life amounts to \$1,200 a year.

WESTERNERS NAMED by national C. of C.

SEVERAL Western industrialists have been named members of the 1955-1956 Manufacture Committee of the United States Chamber of Commerce. The 47-member committee was selected to comprise a cross-section of both large and small manufacturing firms.

The members from Western firms are: *Thomas J. Bannan*, president, Western Gear Corp., Lynwood, Calif.; *Clifford D. Cooper*, president, Horning-Cooper, Monrovia, Calif.; *Cris Dobbins*, president, Ideal Cement Co., Denver; *John Gragg*, plant manager, Associated Plywood Div., United

Operating cost per engine hour for the last 12 months is obtained from the analysis of truck operations. Estimated cost per engine hour after the overhaul and for engine hours operated during the last 12 months is from the same source and other supporting data.

Pinning down costs

Estimated operating cost per year after overhaul is arrived at by extending the engine hours operated during the last 12 months by the estimated operating cost per engine hour after overhaul. In this instance we have multiplied 2,250 hours by 50c per hour, thus arriving at \$1,125 per year.

The original cost of the truck was \$5,000. Useful life to date has been five years, whereas if we were to overhaul the truck it would last another two years, or a total of seven years. On this basis our depreciation rate per annum is \$714.

Total level cost per year to overhaul and operate existing equipment amounts to \$3,114. Replacement cost based on replacement in kind is \$5,500. Estimated useful life based on previous experience is five years. Depreciation rate per annum is therefore \$1,100.

Estimated operating cost per engine hour, based on a five-year average of similar equipment, is 42c. Operating cost per year, based on 2,250 hours per year, is calculated at \$945.

The total level cost per year for a straight replacement unit is \$1,069. This is shown as the estimated annual saving.

The added investment is arrived at by taking the difference between the new truck cost and the overhaul cost of existing equipment. In this instance it amounts to \$3,100, or a percent return on added investment of 34%.

States Plywood Corp., Eugene, Ore.; *Lawrence A. Harvey*, executive vice president, Harvey Machine Co., Torrance, Calif.; *Ralph T. Moore, Sr.*, Moore Timber Products, Grants Pass, Ore.; *Earl O. A. Pearson*, president, Rotex Punch Co., San Leandro, Calif.; *E. J. Simons, Jr.*, president, General Machinery Co., Spokane; *E. D. Starkweather*, director of industrial relations, North American Aviation, Los Angeles; *J. E. Toussaint*, vice president, Standard Oil Co. of Calif., San Francisco; and *Harold L. Zellerbach*, executive vice president, Crown Zellerbach Corp., San Francisco.

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Look into **REVERE** Phosphor Bronze

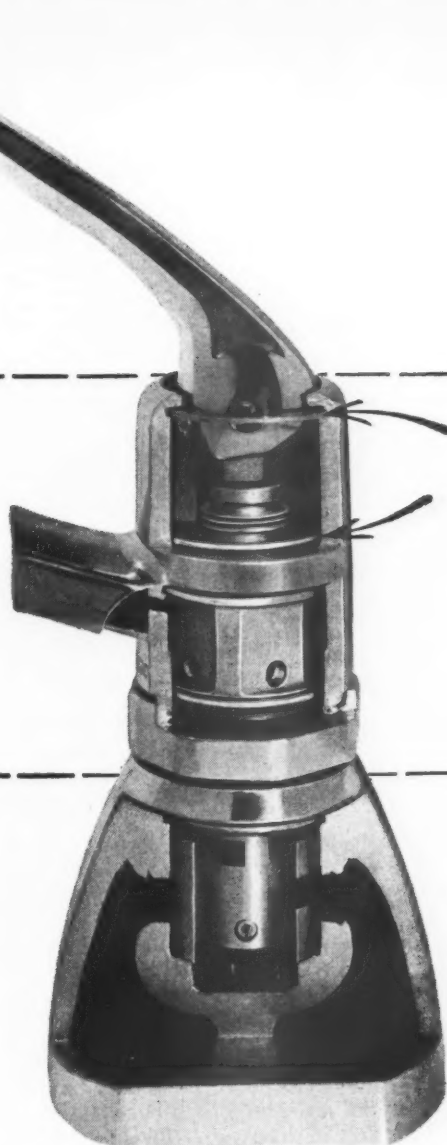
—it pays
RAVENNA
to use it!

This Moen Single Handle Mixing Faucet contains an anchor disc and an anchor washer, both stamped out of Revere Phosphor Bronze Strip. These are small parts, but in a fine product such as this faucet, high quality metals must be used throughout. Here is a condensation of the manufacturer's experience with the phosphor bronze:

Anchor Disc: • Standard punching speed maintained. • No pre-straightening off the arbor for the automatic punching process. • No excessive die wear. • Corners are sharp and clean; no de-burring needed. • Natural mill finish is better than they could achieve by tumbling or burnishing. • High tin content means no lubrication is required; they call it "silent brass."

Anchor Washer: • Have not had a single surface failure. • Dry tumble to de-burr. • Good fatigue characteristics and no obvious signs of corrosion.

Revere offers several types of phosphor bronze, each with slightly different characteristics. In addition to this alloy, Revere also supplies Ravenna with round and octagonal leaded brass tube and free-cutting brass rod, for use in various parts of the valve. We will be glad to collaborate with you on selection of just the right forms of the correct alloys for your products, present or projected. See the nearest Revere Sales Office.



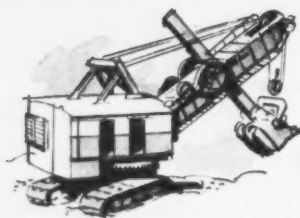
Moen Single Handle Mixing Faucet, made by Moen Valve Co., Division of Ravenna Metal Products Corp., 6518 Ravenna Ave., Seattle 15, Wash.

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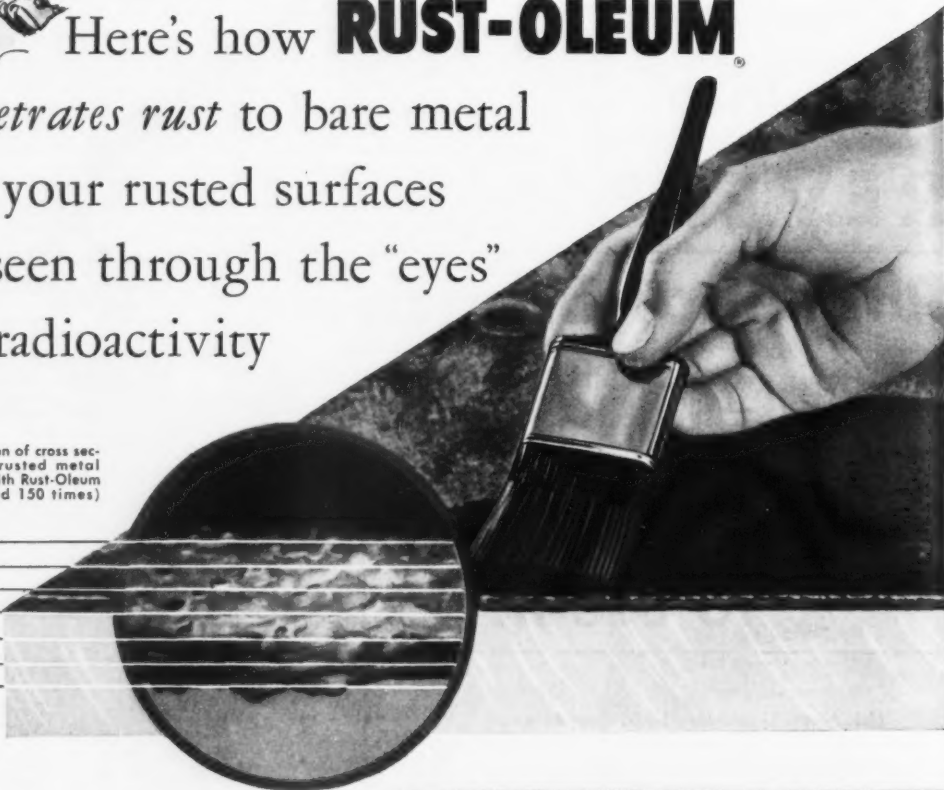
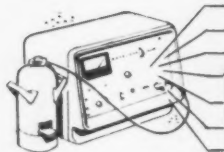
"The Revere Four-Way Service" is a 16 mm. sound motion picture in color, educational and informative. If you haven't seen it, write nearest Revere Office.



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penetrates rust to bare metal
on your rusted surfaces
as seen through the "eyes"
of radioactivity

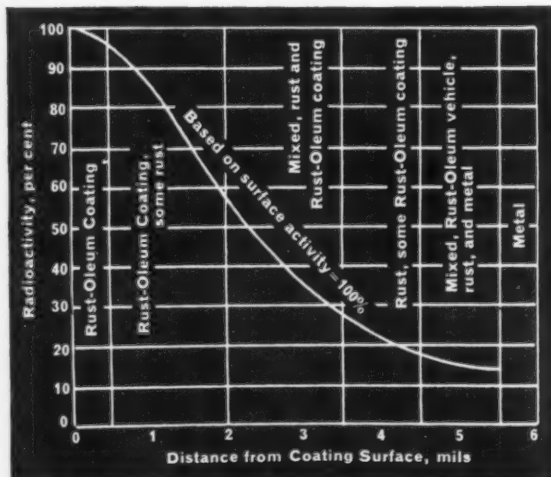
Illustration of cross section of rusted metal coated with Rust-Oleum (enlarged 150 times)



Geiger Counter Traces Rust-Oleum Penetration Through Rust to Bare Metal

When you apply Rust-Oleum 769 Damp-Proof Red Primer directly over rust, the specially-processed Rust-Oleum fish oil vehicle works around the rust particles, through the fissures in the rust formation, and into the pits in bare metal—driving out air and moisture. *Irrefutable proof* of this penetration is now yours . . . the results of nearly three years' research utilizing radioactive tracing with C¹⁴ radioisotope.

The methods and results of this research are presented in a complete thirty-page report, entitled "The Development of a Method to Determine the Degree of Penetration of a Rust-Oleum Fish-Oil-Based Protective Coating into Rust on Steel Specimens," prepared by Battelle Memorial Institute technologists. Clip the coupon to your letterhead for your copy. There is no cost or obligation.



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WESTERN INDUSTRY — November 1955

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HEART OF AUTOMATIC PRODUCTION at Anheuser-Busch's Los Angeles brewery is a group of multi-unit control centers. This one, located in the stockhouse, is one of 13 supplied by Allen-Bradley Co. Five more, arranged for automatic sequence control of the refrigeration compressors and fans through thermostats, are used to control air conditioning systems in various brewery buildings.

Speed goes up — less care needed

*... for Anheuser-Busch in its high speed,
fully automatic Los Angeles brewery.*

A million barrels of beer are produced each year at the Los Angeles brewery of Anheuser-Busch, Inc., in a continuous brewing process. The beer is packaged by a high-speed, fully automatic system at the rate of about 550 cans per minute and 350 bottles per minute.

An operation of this size—in which a breakdown could easily mean the loss of an entire brew—calls for an elaborate power distribution and control system and tops in preventive maintenance policies.

Departments throughout the brewery receive power from two 500 kva. transformer banks rated at 33,000/4,160 v. Each has a 33,000-v. line. The power system includes 100% standby facilities.

Power distribution from a central point goes out to various parts of the plant where it is transformed down to 440 v., 3 phases for power and 208/125 v., 3 phase, 4 wire for lighting. Equipment in the plant includes 1,200 to 1,500 motors and enough capacity for 130,000 lb. of process steam.

Packaging of beer requires automation. A continuous flow of cans and bottles is taken out of the cartons, washed, filled, capped, pasteurized, weighed, packaged, and automatically palletized.

Automation in turn requires preventive maintenance to hold casualties and other forms of down-time to a minimum, and to keep lines operating at peak efficiency. Here are a few fundamentals for preventive maintenance suggested by Charles F. Kitchens, foreman, electrical shop, Anheuser-Busch in Los Angeles, during a talk delivered to the Electrical Maintenance Engineers of Southern California:

1. Keep an adequate supply of spare parts.
2. Have some method for charging parts to proper machines or accounts.
3. Remember that higher speed machines need servicing more often than slower equipment. Determine how often each piece of equipment needs servicing and record the data.
4. Keep accurate records. You may find that you are spending more time

Richards-Wilcox

NEW "460"

Continuous Power Chain Conveyor

✱ Specifically designed to handle
light loads over short distances!



With a capacity of 8½ lbs. on six-inch centers or 17 lbs. per lineal foot and a 200 lb. draw bar pull, R-W "460" offers safer, more efficient handling of light loads. Exceptionally flexible and versatile... lighter load limits... and minimal engineering and structural requirements make it extremely

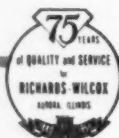
economical. It is recommended as a supplementary conveyor unit in production lines and to facilitate movement and handling where the use of drying ovens, washers, paint sprayers, de-greasers and similar operations are involved. Available up to 200 ft. maximum lengths *only*.



Completely packaged and shipped from stock. R-W "460" Conveyors are completely packaged in easily handled units. Orders to fill any requirement up to the 200-foot maximum are readily filled from stock. For complete information write for descriptive catalog number A-96.

Richards-Wilcox Mfg. Co.

MATERIALS HANDLING DIVISION



BRANCH OFFICE

909 Santa Fe Ave., Los Angeles 21

288 7th Street, Room No. 5, San Francisco 3

... for more details, circle No. 34 on Reader Service Postcard

than necessary on one machine and not enough on another.

5. Schedule down-time with the production department to insure the least amount of lost time.

Automation requires more and more highly skilled maintenance personnel—mechanics, electricians, pipe fitters, etc. Having the best men available, men with some special training in their trade, is the best insurance against faulty maintenance. Men from trade schools are a good risk.

Inspection and general keeping the eyes open for potential breakdowns is an important role of the preventive maintenance man. For example, a few months ago while one of Anheuser-Busch's men was checking, cleaning, tightening screws, and meggering motors on a control center which controls the refrigeration in the stock house, he found that water was coming down from one of the conduits.

The water was running onto the 480-v., 400-amp. bus and was soaking the insulators that hold the spacing on the bus. The condition was corrected immediately. Then a check was made with the production department to see when they could turn the power off so that the insulators could be replaced and the control center dried out.

Cost of this preventive maintenance was \$100. Should the condition have gone unnoticed until the 480-v. bus shorted to ground or phase-to-phase, it would have cost between \$300 and \$600. Production time would have been lost and, without refrigeration, thousands of dollars worth of beer would have fallen below standards and thus been wasted.

MATERIALS HANDLING— PACKAGING SHOW set for July in L. A.

PAN PACIFIC Auditorium in Los Angeles has been named as the site for the 6th Western Packaging & Materials Handling Exposition, scheduled for July 10-12, 1956. Held in San Francisco in 1954, the last exposition attracted an attendance near the 10,000 mark.

Clapp & Poliak, national exposition management firm handling the show, reveals from its San Francisco office that all indications point to considerably increased attendance at the 1956 show. The firm also revealed that many of the nation's leading packaging and materials handling equipment manufacturers have indicated expanded plans for their exhibits.



Clean and comfortable, Western Rock Bit's heat treating department has proved that . . .

Smart housekeeping pays off

Tips from this Salt Lake plant show how it resulted in more efficient production, better morale, and technical advantages.

THE best in cleanliness and comfort is desirable for all plant operations; some cannot operate efficiently without it. Heat treating involving silver soldering is one such operation. Here's how the commercial heat treating facilities at Western Rock Bit Manufacturing Co., Salt Lake City, are kept clean and comfortable at all times.

Heat treating here, under controlled furnace atmosphere, includes silver soldering and copper brazing, hardening of all types of tool steel which involve water, oil, and air hardening methods. Austempering and martempering are also performed in a molten salt bath. The room is 26 ft. wide by 45 ft. long. Ceiling slopes from 10 ft. to 14 ft. above the floor line.

MOBILE QUENCH TANKS GET OIL OUT OF THE WAY

Cleanliness requirements of silver soldering were responsible for the early establishment of strict housekeeping practices at this plant. The

excellent results—which came in the form of efficient production, good working morale, and technical advantages—were so apparent that these practices were extended to all heat treating operations.

A major deterrent to cleanliness needed in the silver soldering operation was oil contamination of parts involved. This was caused by fumes from oil quench tanks. Now, the quench tanks are mounted on casters and removed from the room when not needed. When they are in the room

and not in use, they are covered. Parts, flux, and silver solder are cleaned in solvent and then handled only with tweezers.

Oil quench tanks have integral oil circulating pumps for agitation. Quick-coupling hose connections are provided to permit cooling water hook-up to the tanks. Water cooling is necessary to maintain the oil at proper quenching temperature.

When in use, the oil quench tanks are positioned adjacent to the furnace doors and under one of the large exhausters units which draws off any smoke from the quench.

The brine tanks are similarly mobile and equipped as are the oil tanks. In the case of brine quenching, there are, of course, no oil vapors or smoke with which to contend.

FURNACE SHELL TEMPERATURES KEPT LOW

The atmosphere generator operates at a temperature of 2,200 deg. F. It is gas-fired by burners rated at 155,000 Btu. Products of this combustion pass

AUTHOR OF THIS ARTICLE

CHARLES A. MUELLER

Chief Engineer,
Western Rock Bit
Mfg. Co.
Salt Lake City, Utah



REEVES

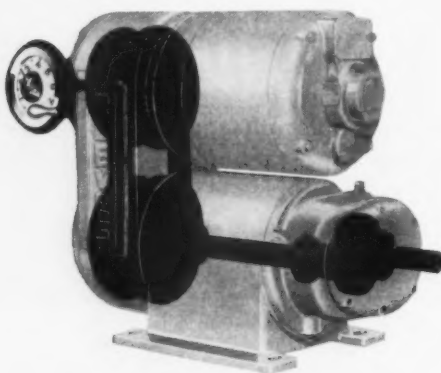
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"... rated up to 2,500 Btu., the long furnace incorporates a water jacketed cooling chamber."

HOUSEKEEPING PAYS,
starts on page 57.

from the top of the generator through flues to a collector canopy, and thence upward through a vertical duct to the outside of the building.

Shell temperature of the generator heating chamber is about 200 deg. F.

Controlled furnace atmosphere is generated from a mixture of propane and air endothermically reacted over a nickel catalyst. The ceramic catalyst retort is located vertically in the center of the generator heating chamber.

Atmosphere passes through a water jacketed surface condenser before leaving the generator. In this way the atmosphere piping to the furnace is kept at room temperature or less.

After passing through the heat treating furnaces, the vented furnace atmosphere is burned either at door vents or at a bleed-off burner on top of the furnace. The atmosphere gas has a very low Btu. rating and little heat is produced. However, the front door vent of the long furnace is hooded; the heat and the products of combustion are ducted from the room. Surface temperatures of the furnace shells are from 200 to 300 deg. F. The long furnace, which is rated up to 2,500 deg. F., incorporates a water-jacketed cooling chamber. The shell temperature of this section does not exceed 120 deg. F.

SALT BATH COVERED TO KEEP HEAT IN

Diagonally across the room from the atmosphere generator is the molten salt bath unit for austempering and martempering. The salt bath is usually operated at 550 deg. F. and has an exposed surface area measuring approximately 24 x 24 in. When not in use, this bath is protected with an asbestos board cover. The bath is heated with Calrod heaters. Therefore no products of combustion or heat from burners have to be considered.

USE EVAPORATIVE COOLING SYSTEM

Two air exhaust units are located on the roof, 3 ft. inward from the

highest edge and spaced 12 ft. apart; each unit is, therefore, 6 ft. off the room center line, measured on the 45 ft. length. These units are motorized size 24 in. Breidert air exhausters. Driven by a $\frac{1}{3}$ -hp. motor, they operate at 350 rpm. fan speed.

Inlet air to the room is supplied by two Essick evaporative coolers using 1-hp. motors with pumps. These units are also roof-mounted on the opposite side of the room from the exhausters, 3 ft. inward from the lowest ceiling edge, and 6 ft. from each end of the room. Baffles are arranged on the cooler outlets to direct the incoming air downward, as well as along the wall to insure against any stagnant pockets.

TECHNICAL GAINS ALSO REALIZED

Several technical benefits also stem from this arrangement of facilities and housekeeping practices.

Control instrument panels are convenient for settings, and are easy to observe. Although the furnaces are equipped with excess temperature protection instruments, a temperature abnormality would be quickly detected.

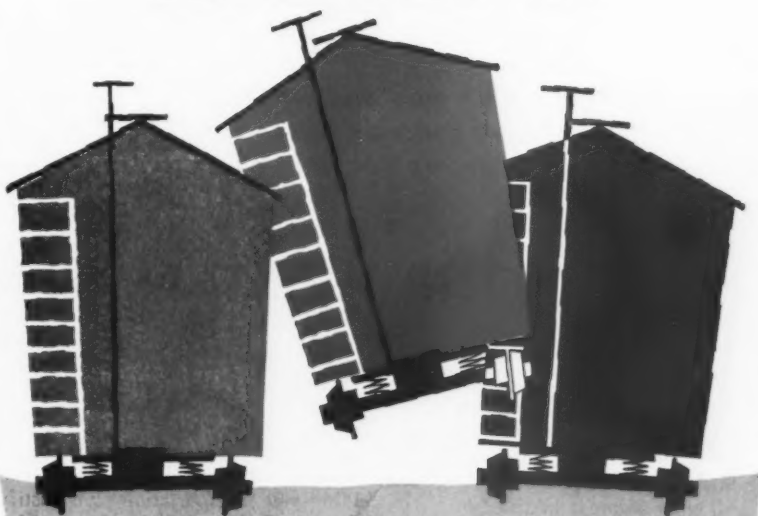
Generator intake air filters for combustion and for atmosphere seldom require cleaning. This is beneficial to proper operation of the metering flowgages, and to the gas-air mixing pump. There have been no major repairs to any of these items since they have been in operation.

Controlling the room air supply is also instrumental in maintaining accurate and consistent quality of the furnace atmosphere. Atmosphere is generated from two ingredients: propane and room air. These are proportioned at the carburetor of the gas-air mixing pump; consequently any contamination of either of these constituents would affect the atmosphere being produced. Critical heat treatments, especially those involving carbon restoration and neutral hardening, can be carried out confidently when the atmosphere is unvarying in character and may be precisely controlled.

OTHER HOUSEKEEPING AND SAFETY FEATURES

The concrete floor of the room is swept and wet-mopped at least once each week, and as much oftener as is necessary in the case of oil splash. Walls and ceiling of the room are painted light green in color. The building is fully insulated. It is also protected with an automatic sprinkler system.

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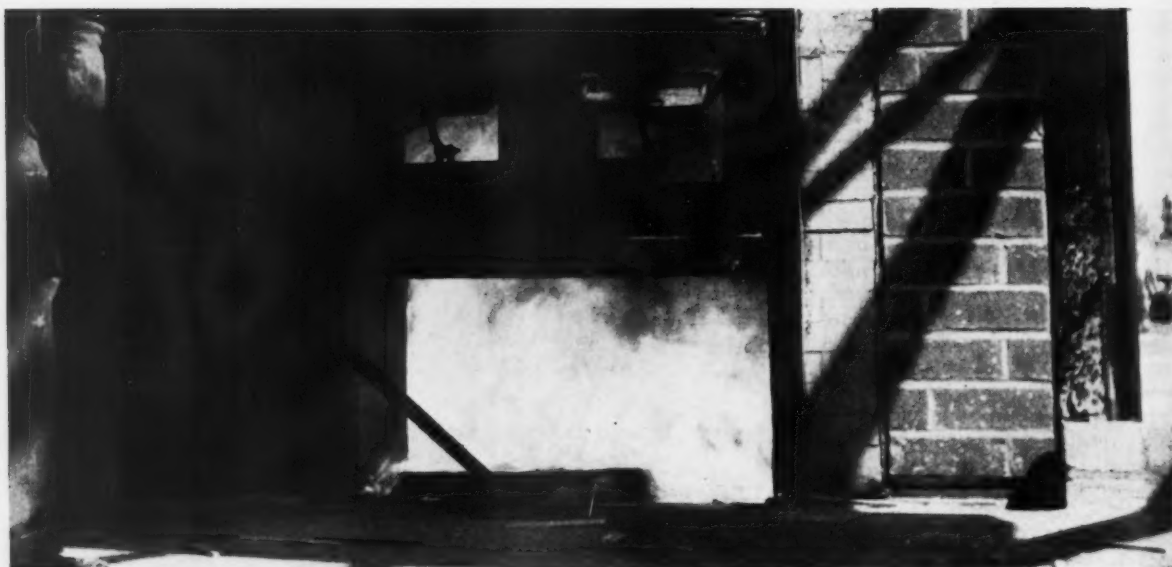
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Incinerators can be an easy and effective way to keep your plant backyard clean, but air pollution laws are getting stricter—look at Los Angeles! Because building them right takes know-how, here are tips from an expert on today's best ways to . . .

Burn your waste—lawfully

When a WESTERN INDUSTRY reader, a plant engineer, suggested that an article pertaining to incineration would be of wide interest in the West, the editors of WESTERN INDUSTRY agreed. Air pollution control has created increasingly difficult problems for Western plants in recent years, and effective incineration of wastes is becoming more and more important.

This treatment of the subject by an associate of the Smith Engineering Co. stems from 30 years of experience by his firm in Southern California, where air pollution control laws are most stringent.

This firm has over 150 industrial incinerators in operation in Los Angeles County alone. In regard to design of this equipment, Mr. Steinbacher states that there is no substitute for experience and that the Southwest has pioneered and is now several jumps ahead of the rest of the country.

INCINERATORS, furnaces for burning waste, if properly designed, may be placed within or adjoining buildings where waste is generated. The obvious savings in handling and transportation costs justify the use of relatively valuable space for the incinerator and an expenditure of labor for its operation.

However, the problem of air pollution control has rapidly grown in the West—in proportion to industrial growth—from a matter of "fly-ash" nuisance to a serious and unhealthy situation in some areas. Thus, designs of all combustion equipment are due for many major changes with a view toward complete minimization of combustion contaminants.

Due to the nature of fuels involved and other operating problems, the incinerator industry has found it difficult to make the required design changes. The Los Angeles area, with an acute smog problem and rigid air pollution control law, has been greatly affected by the need for incinerator redesign and the multi-chamber, high temperature incinerator—developed years ago—has already undergone much metamorphosis.

However, from this constant state of flux has emerged a pattern and, in recent months, test data have indi-

cated such success that we believe future developments will be only minor refinements upon present designs.

SMOG LAW GOVERNS DESIGN

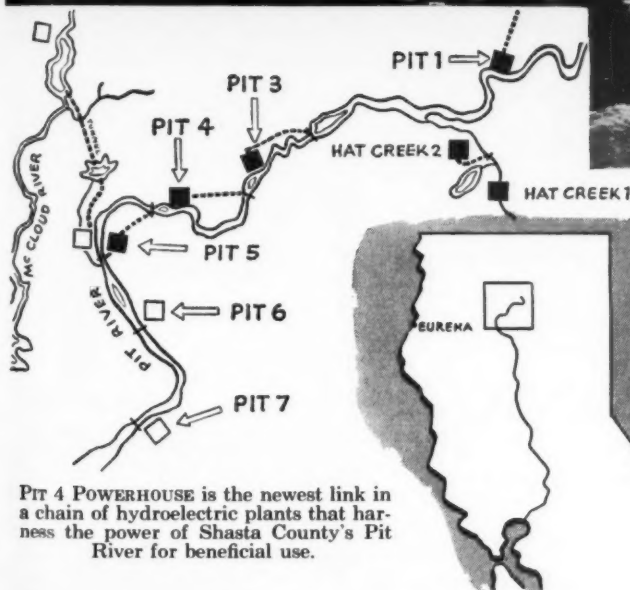
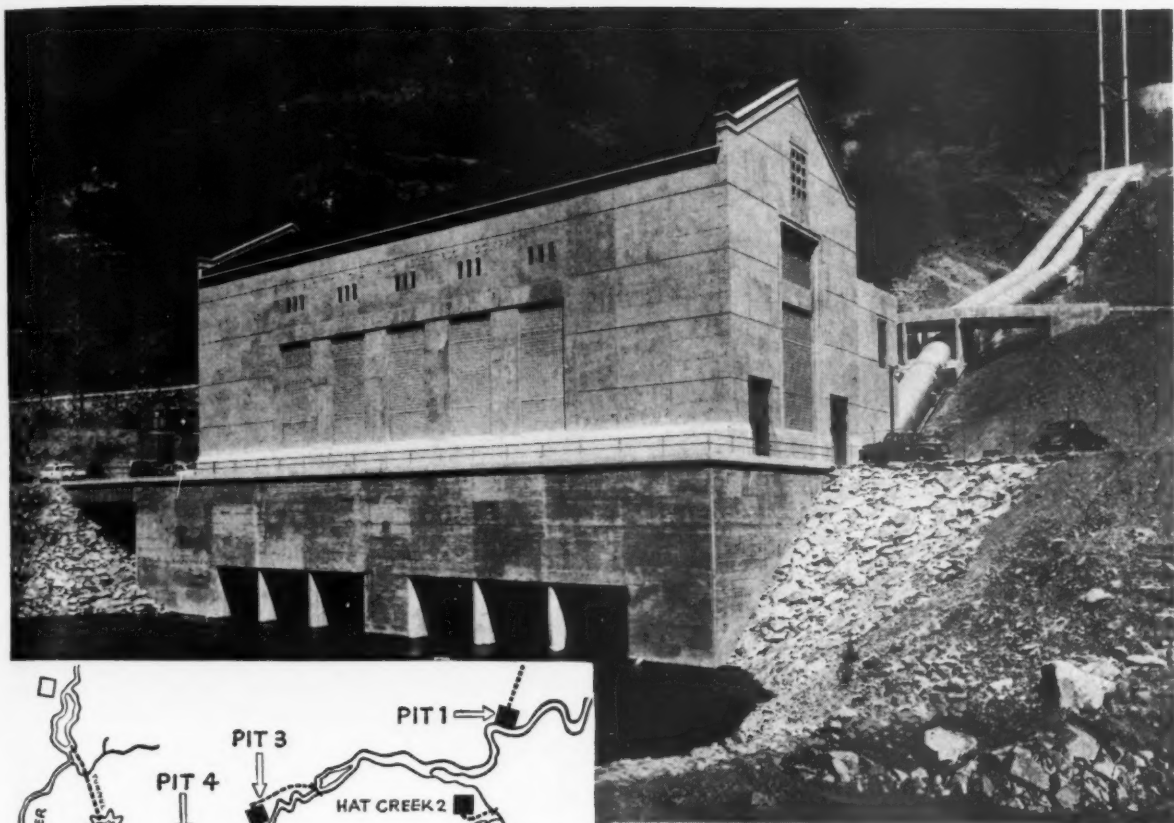
Air pollution laws governing effluents from the combustion of refuse fall generally in the categories: (1) visual emissions (smokes), and (2)

AUTHOR OF THIS ARTICLE

B. C. STEINBACHER
Smith Engineering
Co.,
Refuse Disposal
Engineers,
Pasadena, Calif.



"Designs of all incineration equipment are due for many major changes with the advent of greater, more populous urban areas and the terrific growth of our industries which has rapidly turned the matter of air pollution control into a complex problem."



PIT 4 POWERHOUSE is the newest link in a chain of hydroelectric plants that harness the power of Shasta County's Pit River for beneficial use.

The Pit 4 Powerhouse, completed August, 1955, adds a whopping 84,000 kilowatts of electricity to P. G. and E.'s Pit River hydroelectric system.

It becomes the sixth plant in the mighty Shasta County chain, but it by no means ends the hydroelectric potential of the Pit and its neighboring McCloud River. The company has applications pending to build four new power plants, totaling 396,000 kilowatts, on these two rivers.

During the postwar decade alone, Pit 4 is the fourteenth power-generating plant built by P. G. and E. as a part of our \$1½ billion expansion program.

And it's another example of how we're accomplishing our big aim: Keeping pace with the tremendous growth of Northern and Central California... and we're making sure there's always plenty of dependable, low-cost electric power for industry and business, for home and farm.

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... now made with
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these Xtra advantages



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particulates (sometimes referred to as solid products of combustion). Although the visual emissions are not always combustible, and the particulates only partially so, our goal lies in elimination of both these classes of contaminants within the combustion process itself.

Such a solution forestalls the necessity of control equipment (i.e., after-burner and dust collectors), and therefore represents the most economical incineration system. If the particulates are to be eliminated by preventive methods in the ignition process, it follows then that this must be done in the firebed itself.

A great deal of work has gone into the study of the ignition chamber, particularly with regard to grate loadings, height of the arch above the firebed, firebed depths, firebed temperatures, location and size of combustion air inlets, draft conditions, gas flow, and horizontal proportions of this chamber. The smokes and combustible particulates are consumed not only in the ignition chamber but also by secondary combustion in the after-chambers.

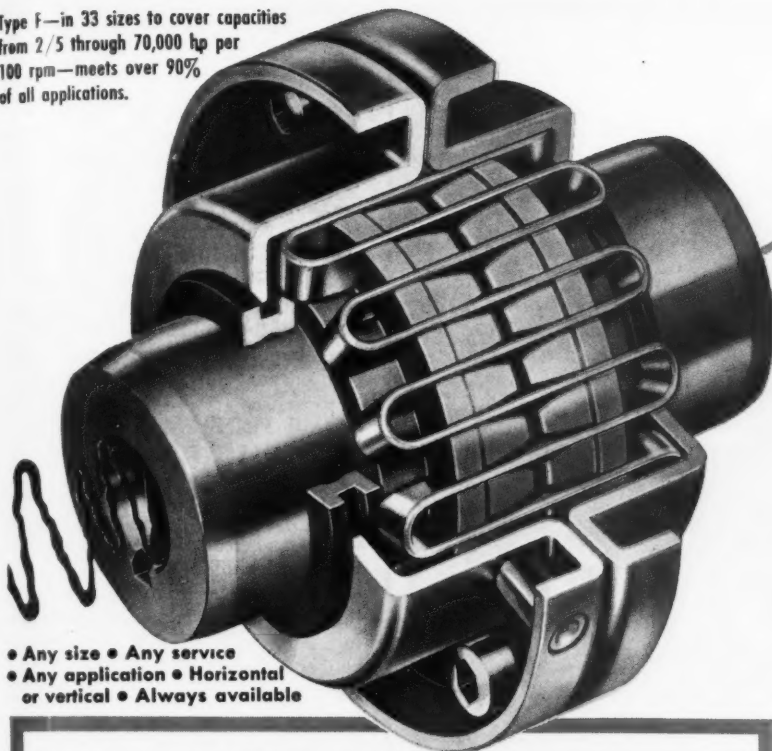


UNLOADING WASTE from trucks is an easy matter with this incinerator built at truck bed height. Note also the ramp for hand cart access.

Thus, the design of these chambers is affected primarily by turbulence, secondary air, and other combustion considerations, while their ability to catch the particulates which have escaped the primary chamber is of minor importance. There are water-wash devices sometimes used in conjunction with the so-called "stackless" incinerators which are useful in eliminating most of the larger particles.

Since its formation, the Los An-

Type F—in 33 sizes to cover capacities from 2/5 through 70,000 hp per 100 rpm—meets over 90% of all applications.



- Any size • Any service
- Any application • Horizontal or vertical • Always available

Why FALK Steelflex Couplings give the finest protection for connected machinery

Maximum protection of connected machinery is best provided by Falk Steelflex Couplings because, thanks to their exclusive design, they overcome the damaging conditions of shock loads, shaft misalignment and vibration. How this unique multiple protection is made possible is shown at the right.

Falk Steelflex Couplings give the most economical protection, too, because they make connected machinery last longer and give better service. Furthermore, when actual coupling costs are figured per year of service, Falk Steelflex Couplings show substantial savings through their rugged all-steel construction, easy interchangeability and low maintenance requirements.

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Couplings and spare parts in Factory Stock at Oakland, California and Portland, Oregon. Authorized stocking Falk Distributors throughout the West.

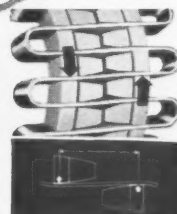
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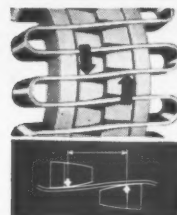
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Exclusive FALK Steelflex grid-groove design smothers shock and vibration.

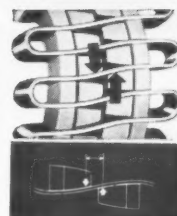
The damaging effects of shock and vibration can shorten the life of any connected machinery. Here is how the Steelflex grid-groove design overcomes these common enemies.



Under LIGHT LOADS
The gridmember bears only at outer edges of grooves. The long span between points of contact remains free to flex under load variations.



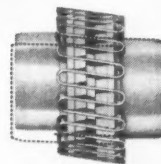
Under NORMAL LOADS
As load increases, the distance between supports on the grooves is shortened proportionately, but a free span remains to cushion shock loads.



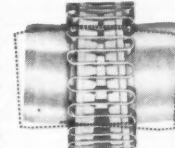
Under SHOCK LOADS
Under extreme overloads, the grid-member bears fully on the grooves and transmits full load directly. The coupling remains flexible, within its rated capacity.

...Accommodates shaft misalignment and free end float

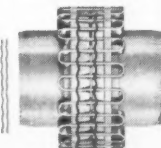
Basic maintenance procedure dictates regular inspection and correction of shaft alignment. Between inspections, Steelflex couplings provide protection by accommodating unavoidable shaft misalignment and end float. The gridmember which connects the two hubs of a Steelflex coupling is not fastened to either hub, so each hub can shift without imposing load on the other shaft.



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geles County Air Pollution Control District has spent thousands of engineering manhours studying and promoting design features in combustion equipment affecting the character of the effluent gases with no particular thought about structural, operational, or economic problems. It has been and continues to be the problem of the combustion industry to comply with the design requirements of the Control District, while at the same time satisfactorily solving these other three phases of the problem which are of utmost importance to the owner of the equipment.

SOME PROBLEMS SOLVED SO FAR

We have arranged furnaces in every manner imaginable and have charged, stoked, and cleaned them with all manner of mechanical devices.

There have been unique after-burning problems solved, such as consuming smoke from burning off very large rubber strainers and rubber clogged pipes in the synthetic rubber industry, consuming smoke from chute-fed incinerators, incinerating exhaust air from the ventilating systems of laboratories handling deadly bacteria, and even burning off the smoke and odor in the exhaust from a charcoal broiler.

The "stackless" incinerator is a very useful device around airports where clearance is a problem or for architectural effect where a stack is undesirable. In adapting the use of induced draft fans in eliminating stacks, it was found that the simplest method for reducing temperatures for safe fan operation was by water spray quenching. A happy side effect of knocking down large fly ash particles was soon realized from this adaptation.

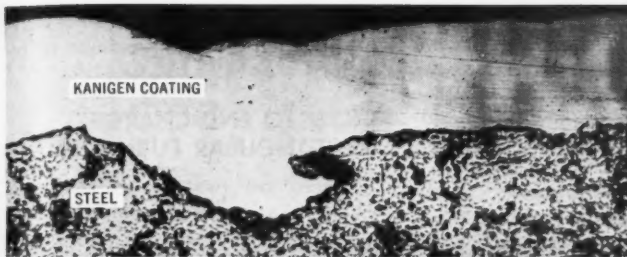
SIMPLICITY; MINIMIZE MECHANICAL DEVICES

It is good policy to keep furnaces simple and to keep mechanical equipment at a minimum unless there is good reason for its use. A most important factor in determining the need for a mechanical device on a furnace is its size.

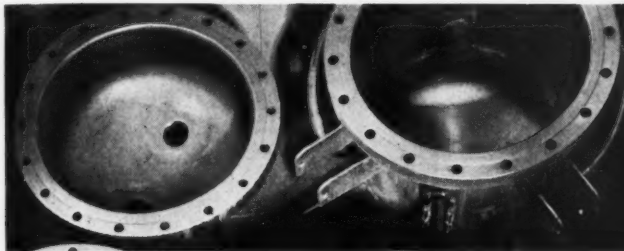
As a general rule, mechanical feeders, stokers, or ash removers are wasted on furnaces with capacities up to 1 ton per hr. It will be found that the manhours consumed in operating and maintaining the machinery on equipment this small will be as great as complete manual operation of well designed equipment of equal size.

The exception to this rule is the feeding of sawdust or some similar homogenous waste fuel which can be

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photomicrograph showing uniformity of Kanigen coating over steel (250X)



Kanigen-coated pressure vessels



Kanigen-coated aluminum electronic assembly ready for soldering



Kanigen-coated screw conveyor: 9" diameter; 10' length

Could you use Kanigen* coating to prevent iron pick-up? To form an alkali-resistant surface? To apply a coating of virtually non-porous nickel-phosphorus to many metallic and non-metallic materials... without the use of electricity?

Can your product benefit from the hardness of Kanigen coating? Would coating aluminum to increase surface hardness and permit solderability give your product an advantage?

Is uniformity of coating, even on complex shapes, important? Could you lower your costs with a uniform coating of Kanigen that offers a service life comparable to that offered by costly clad or solid materials?

Does coating on plastics (printed circuits, for example) seem worth investigating? There is nothing like Kanigen. Metallurgically unique—not just a substitute for electroplate—it has many unexplored uses. It is available only from General American and our licensees.

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"KANIGEN" is a mark identifying chemical deposition of a high-nickel, low-phosphorus alloy by General American Transportation Corporation and its licensees, and the coating resulting therefrom.

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metered into the furnace mechanically without an operator in attendance. A common error in this regard is sometimes the reasoning that a heterogeneous mixture of refuse might be ground up by a "hog" and then mechanically fed to the furnace from a bin.

The important factor ignored by such reasoning is the fact that the mouth of the "hog" will normally be smaller than the charging door of the incinerator and, disregarding power usage, the labor problem of feeding the "hog" will normally equal or exceed the labor for charging this same material directly into the furnace.

To save labor and to make these smaller furnaces easy to operate, we suggest they be depressed so that the charging door is at grade. Another way to get the same effect is by building the furnace against a charging dock.

In the smallest of furnaces, a handy charging device is a metal hopper fastened to the charging door opening so that a box or barrel full of refuse may be dumped upon it and then shoved into the furnace.

As the incinerators become larger, the heterogeneous nature of the refuse creates unique problems of charging and stoking and the use of mechanical

equipment to do this work is not only justified but many times almost mandatory.

HOW TO END-CHARGE RECTANGULAR FURNACES

There are two systems for end charging a large rectangular furnace which we consider acceptable. First of these is the tractor powered bulldozer which pushes the refuse into the furnace, which has been depressed with the charging door still at grade. The second acceptable method is the use of a pan conveyor to raise the refuse above the furnace and drop it into a sloping chute at the charging door.

Both systems have been used very successfully on incinerators burning from 8,000 to 10,000 lb. per hr. Because of the wear and tear of such charging systems on the furnace, certain other structural features must be incorporated in them. For example, we have developed an air-cooled cast iron charging door jamb to resist the abrasion caused by the bulldozer, and we have developed a special heavy duty grate to withstand the impact of pole butts dropping off a pan conveyor 15 ft. above.

As the furnace becomes larger and the refuse load heavier, stoking (agitating the firebed and moving it to the dumping grates) becomes more and more a problem. To insure complete combustion because of air pollution control requirements, high furnace temperature must be maintained. To prevent the formation of non-combustible fumes in the ash bed, under-fire air must be kept to a minimum.

These conditions create extreme hazards for mechanical stokers. We have developed two types of stokers which will stand up under these difficult conditions. One is a packer type of stoker which consists of a gang of heavy quadrants which operate up through slots in a sloping grate and pack the material onto the dumping grates. The other system consists of gangs of rotary blades which operate up through the slotted grates to push the rubbish through the furnace.


In either system, the stokers are at rest in the relative cool of the ash pit for the greater part of the time, thus preventing warping and binding of the stoker from the intense furnace heat. The principal advantage of these stokers is that they permit end feed of large rectangular furnaces. Without them, it becomes necessary to top-charge or sidecharge any furnace over 2,000 to 3,000 lb. per hr. and thus create the ignition problems and gas flow problems inherent in such charging systems.



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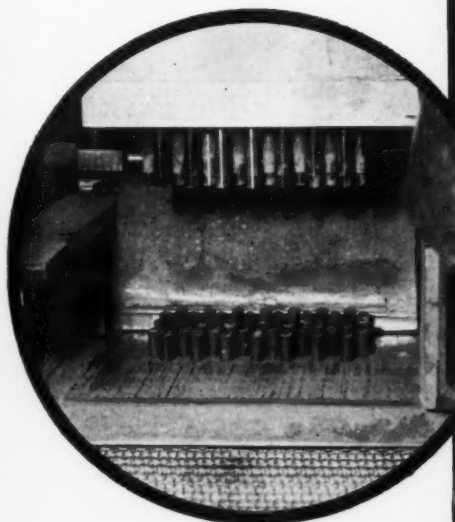
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Many operations of compacting powdered materials can now be done faster, simpler . . . at substantial reductions in cost with Denison hydraulic Multipress and accessory equipment. Have a Denison Engineer study your operations and demonstrate how. Write.

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PROTECTS SURFACES after rust begins

CAN a protective coating penetrate layers of rust and reach bare metal? Rust-Oleum Corp. claimed their product could and now Batelle Memorial Institute technologists in Columbus, Ohio, have proved the claim.

When first attempting to trace the vehicle of the preventive coating applied over rust, X-ray techniques were used. However, this method did not reveal any conclusive evidence. So, Rust-Oleum turned the problem over to the research organization.

First, the major chemical constituents were identified in the fish-oil-based vehicle of the coating. The main base constituent was determined to be glycerol, common to all fish oils, in the form of triglycerides.

Then the glycerol was synthesized using radioactive C¹⁴. Painstaking efforts were put into testing the synthesized agent to establish that it was identical to the original oil.

Next, the glycerol portion of the fish oil was replaced by the radioactive constituent. The vehicle was then processed by Rust-Oleum to produce a coating equivalent to the standard product.

Seven badly rusted steel test panels were scraped and wirebrushed in conformance with the manufacturer's standard application directions. The radioactive primer was then brushed on over the rusted surfaces and allowed to dry for two weeks.

Instruments look below the rust

Then the panels were placed in a lapping device and, using crocus cloth as an abrasive, they were shaved downwards. Measurements were taken at each 0.5-mil level. Geiger-Mueller tube and gas flow proportional counters were the instruments used to measure the radioactivity of the surfaces.

Results showed that the protective coating penetrates through rust to bare metal with approximately 15% of the surface radioactivity being found at bare metal. Also revealed was the fact that the coating pigment and fish oil vehicle combined penetrate to about 4.5 mils depth. From that point, the fish oil vehicle alone penetrates through the remaining rust.

A 30-page report covering the details of this test has been prepared by Battelle Memorial Institute and it is available upon letterhead-request directed to Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill. Or, circle No. 300 on this month's Reader Service Postcard.

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for the West's plant
operating executives

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78-page reference on all-purpose metal framing

Catalog 700 (AIA File 14-G) is a 78-page reference and guide on Unistrut all-purpose metal framing offered to plant operating executives and distributors. Booklet has a section with 36 unusually interesting application photographs. Reference tables and data included. *Unistrut Products Co.*

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48-page manual on lead acid batteries

Covering batteries for all types of motive power application, this complete cross-reference guide includes photographs, charts, tables, methods of repairs, maintenance and salient points of operation, instructions covering repairs with regular or special tools, simplified testing methods, and instruction on correct charging methods. Manual covers industrial cycle service in its entirety, including industrial truck, car-lighting, air conditioning, marine, locomotive, diesel starting, etc. *C & D Batteries, Inc.*

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Technical application data on electric resistance welding

Technical data and information on latest research and application in field of electric resistance welding is now available to interested firms from Sciaky Research Center, Los Angeles. Some of the clients whose projects are described are: Douglas Aircraft, Boeing Airplane, General Electric, Goodyear Aircraft, AiResearch, North American Aviation. Metals used in-

clude various alloys, nickel, inconel, titanium, zirconium, stainless steels, and metals in nimonics series. *Sciaky Research Center*

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Data book on Dodge shaft-mounted speed reducers

Here are 28 pages of technical data on Dodge Torque-Arm speed reducers, which are mounted directly on shaft to be driven, eliminating use of flexible coupling, belt take-up, and reducer foundation. Tables cover selection of speed reducer size, ordering instructions, recommended V-belt drive. *Dodge Mfg. Corp.*

... for your copy circle No. 153

20-page guide: install your own conveyors

Here's an "install-it-yourself" guide to conveyors, a catalog of Lamson pre-engineered units written for the plant man who wants to pick the right kind of conveyor for his operations. Method of analyzing loads for weight distribution and grade is followed by description and charts on wheel and roller gravity, belt, and live roll conveyors. Tables tell how to figure conveyor lengths and load friction losses. *Lamson Corp.*

... for your copy circle No. 154

Buyer's guide to sheet and strip

New 8-page bulletin (No. 20-1) lists over 20 different kinds of flat rolled steel furnished in coils, stock sizes, and cut-to-order blanks. Suggestions are given for stock selection and buying. *Joseph T. Ryerson & Son, Inc.*

... for your copy circle No. 155

Specs on rubber belting and hose

This catalog digest gives specifications and descriptions of 68 different rubber hose for industrial and agricultural use, as well as data on 9 types of conveyor belts, 7 types of flat power transmission belting, chute lining, and other industrial rubber products. Illustrated, too. *Thermoid Co.*

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162-page manual on steel fabricating

Forming—machining—cutting—joining—heat treating and pickling—and finishing are the major subdivisions of this 162-page manual on fabricating Rezilast stainless steels. Tables, diagrams, and sketches add to the value of detailed, up-to-date text. Last section, reference data, covers technical information on each type of Rezilast stainless steel, tables for estimating steel needs, and conversion and tolerance tables. *Crucible Steel Co. of America*

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Electronic instruments for industrial maintenance

Test equipment for electronic measurements and industrial maintenance is listed in Weston Catalog R-36-A. Among the units pictured and described are: clamp volt-ammeter, industrial circuit tester, AC industrial analyzer, electron tube analyzer, vacuum tube voltmeter, calibrator, ohmmeter. *Weston Electrical Instrument Corp.*

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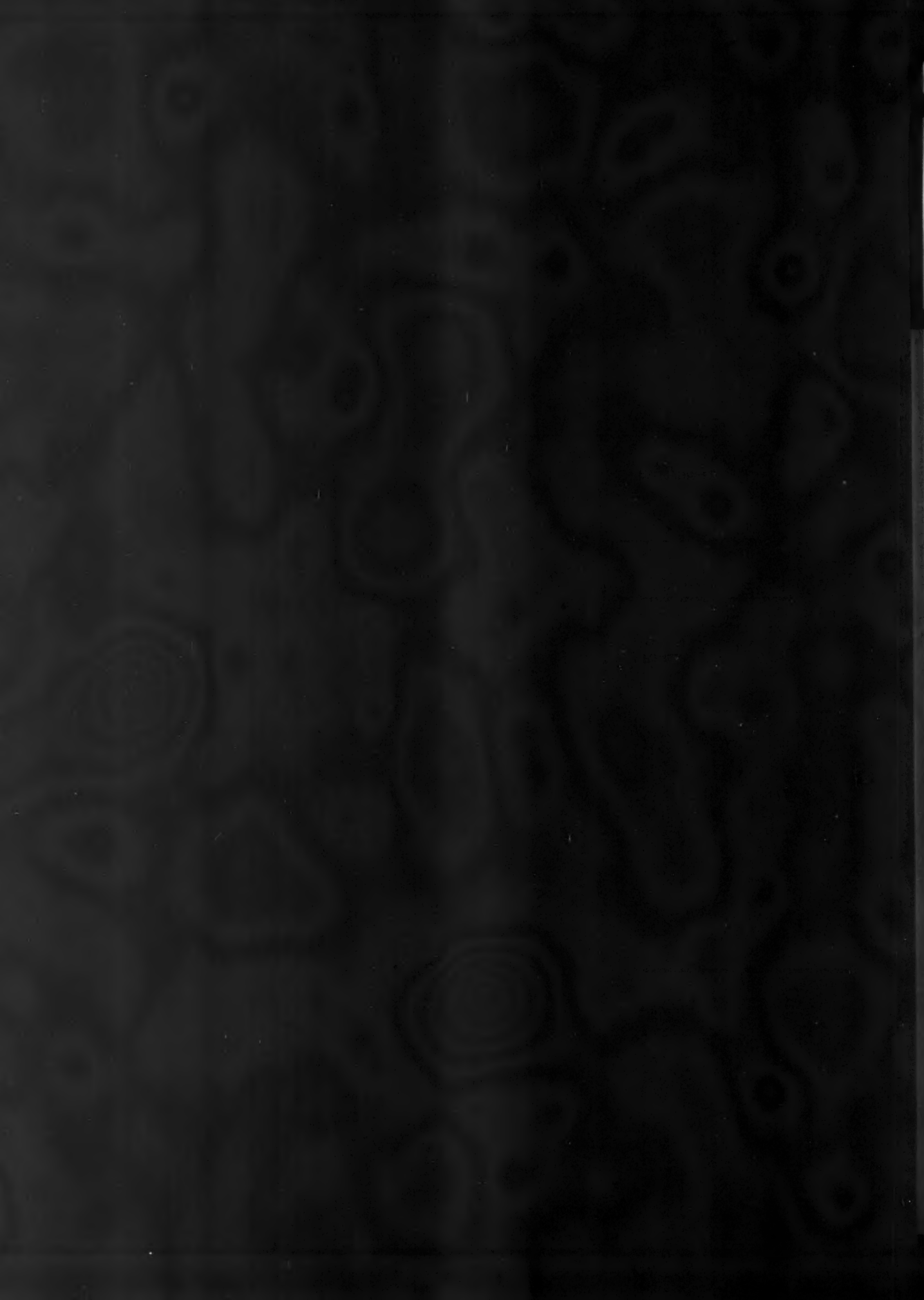
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WHAT'S YOUR PROBLEM TODAY?

Make use of *Western Industry's* special service for readers. These business reply cards provide a quick, easy way to obtain full details on products and services described or advertised in this issue.

In addition, *Western Industry* will provide you with special help in locating sources of information concerning unusual plant operational problems you may have. Write and describe your problem briefly. *Western Industry* is particularly equipped to help you in the fields of:

Power transmission
Materials handling
Plant electrical installations
Fluid and air handling and control
Power and hand tools
Plant building materials and service equipment

Adhesives and abrasives
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Air conditioning
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Automation and systems engineering

Here is a 12-page illustrated booklet (C 901) telling what the control industry can do today, with a reasonable investment. Systems described are drawn from actual installations made for a variety of industrial firms by this company's systems engineering group. *Berkeley division of Beckman Instruments, Inc.*

... for your copy circle No. 159

Specs and installation ideas for aluminum pipe and fittings

Industrial applications, advantages in various types of service, and specifications are provided, in new booklet on aluminum pipe and all types of appropriate fittings and valves. Tables and graphs provide extensive dimensional and performance data. Installation details cover: cutting, bending, beveling, grooving and threading, welding and joint make-up; use of supports; thermal insulation, etc. *Aluminum Co. of America*

... for your copy circle No. 160

Fractional horsepower variable speed drives

Ajusto-Spede drives are introduced in this booklet, which gives their outstanding features, fundamentals of operation, capacity, mechanical construction, and method of speed control. *Dynamatic Division, Eaton Manufacturing Co.*

... for your copy circle No. 161

Safety electrification of cranes and monorails

Detailed engineering data for Insul-8-Bar safety-type systems designed for use with either new or existing American MonoRail installations, indoors or out, is given in new catalog. Illustrated with drawings and diagrams, 8 pages. *American MonoRail Co.*

... for your copy circle No. 162

Details of an all-around materials handling unit

Application photographs highlight maneuverability of both 3-wheel and 4-wheel model, and drawings show details of construction and controls of the Kwik-Mix Moto-Bug, which has three interchangeable attachments—hopper, platform, and fork lift—on a standard chassis, in 8-page brochure. *Kwik-Mix Co.*

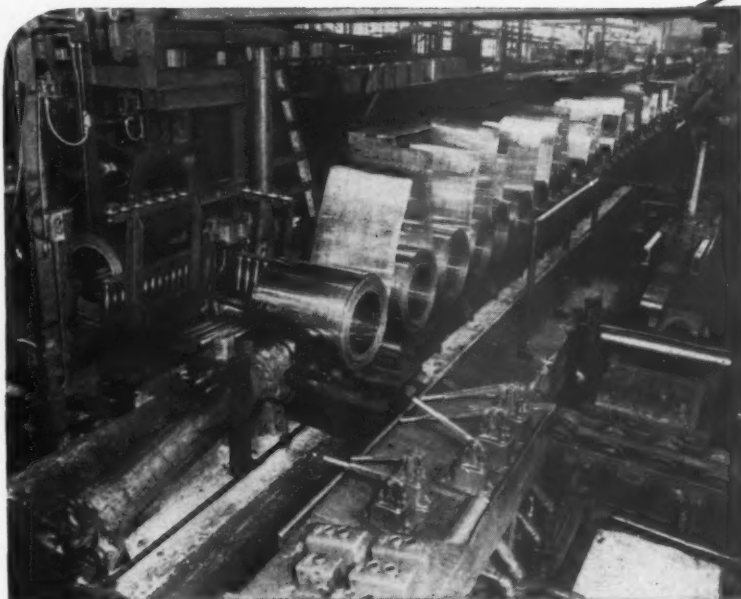
... for your copy circle No. 163

Automation

WE'VE WORKED TOWARD IT

FOR 50 YEARS AND CALLED IT

CONTINUOUS FLOW



Typical Mathews conveyor system made up of power conveyors and special conveying machinery in modern brass mill.

Mathews conveyers have for 50 years been helping manufacturers progress toward automation by handling materials to and from processing machines with a minimum of manual effort. Today, in almost every industry in plants throughout the United States and Canada, Mathews mechanized handling is at work creating a smooth, continuous flow of materials.

For information, write to the Mathews field office or plant nearest you. Ask for Catalog 853-R.



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MATHEWS

... for more details, circle No. 47 on Reader Service Postcard

Protective tape coating

Folder gives a quick introduction to Tapecoat-X, a coal-tar coating in tape form made with extra coal tar thickness for single-wrap application. Sizes and coverage are tabulated. *Tapecoat Co.*

... for your copy circle No. 164

Fornaciari catalog

Services of this Southern California equipment distributor are detailed in new 66-page catalog, covering all manufacturers that the firm represents. Alphabetical index is a

handy guide to products sold or rented by this firm, from air compressors to winch hoists. *Fornaciari Co.*

... for your copy circle No. 165

Conveyor belting

Here's a wall chart, measuring 23x33 in., on proper selection and maintenance of conveyor belting. It lists types of belts suited for particular uses, such as mining, metal processing, food processing, chemicals, and coal handling, and offers 12 practical maintenance tips. *Hewitt-Robins Inc.*

... for your copy circle No. 166

When investment casting can reduce your costs



This booklet has the answer—listing five conditions where investment casting may mean improved design, mass production techniques, and cost savings. The special services of Bone Engineering, from tool design to inspection, are given as added reasons for considering a switch to investment casting. *Bone Engineering Corp.*

... for your copy circle No. 167

How to assemble, install high-pressure hose

New bulletin 3040-A covers Hi-Duty pressure hose and reusable couplings for heavy duty applications. Types described are single wire braid, cotton covered hose; single wire braid, rubber covered; and double wire braid, rubber covered. For each type, a "how to assemble" page gives step-by-step illustrated instructions. Right or wrong ways of installing hose assemblies are diagrammed on last page. *Imperial Brass Mfg. Co.*

... for your copy circle No. 168

Package drives for variable speed control

What is a package drive? What does it do? Why is it packaged? Where can it be used? These questions are answered, with diagrams and equipment photographs, in Bulletin 51B8166, covering Allis-Chalmers package drive in sizes from 5 to 200 hp. for precise variable speed control. *Allis-Chalmers Mfg. Co.*

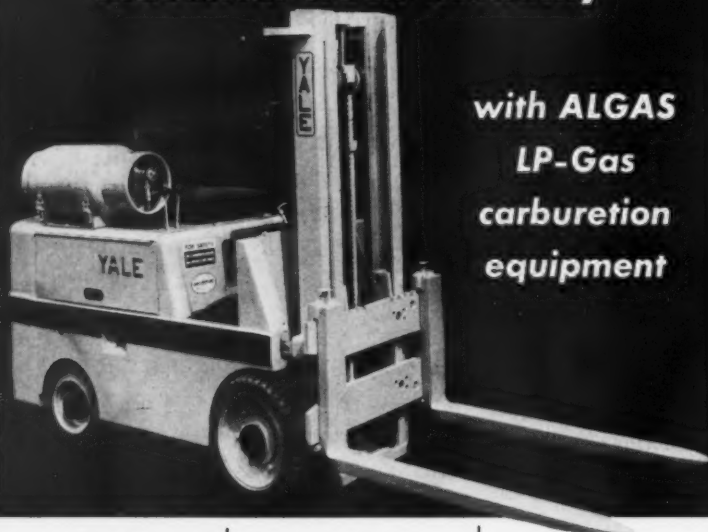
... for your copy circle No. 169

Air motor applications

Bulletin ML-3 is a new 8-page booklet which contains full-color illustrations of Bellows air motor and its interchangeable valves, as well as ten typical application photographs. Other standard items covered include drill press feeds, vises, Hydro-checks, rotary feed and index tables, self-contained drilling units, and valves and cylinders. *The Bellows Co.*

... for your copy circle No. 170

YALE achieves industrial truck economy



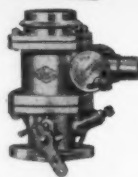
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1900-E Converter
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670 Filter



1400 Series Carburetor

In the field of internal plant transportation equipment, Yale materials handling equipment is widely recognized for its efficiency and advanced engineering. Now, Yale's engineering brings you equipment designed for LP-Gas operation. In selecting the carburetion system for this equipment, Yale made sure that performance and economy of operation were paramount. ALGAS, pioneers in the field of LP-Gas carburetion equipment, is proud of this opportunity to serve Yale and bring better service to industry.

Write us for information on LP-Gas operation for your material handling equipment

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... for more details, circle No. 48 on Reader Service Postcard



AIM* for high volume, production line packaging with fast Acme Steel Strapping Machines



Acme Idea Man
John Everett,
Los Angeles,
introduced this
strapping system
to Graning
Enameling Co.

ask your
***Acme Idea Man**
to help solve your
problems

Since the Acme Steel F1 Strapping Machine was installed at Graning Enameling Co., El Monte, California, *one man straps as many kitchen sinks and laundry trays as could be done before in two shifts.* That's a saving of eight man hours each day. (Idea No. S4-1) Sinks are put on wooden bases and rolled along conveyor to the strapping machine. *The F1 machine tensions, cuts and seals steel straps automatically.* The whole strapping operation is completed in seconds. Package weight is reduced. Dunnage is less.

You'll find the Acme Steel Strapping Machine has other valuable advantages. Ease of operation, less worker fatigue. The machine applies each strap with uniform tension insuring maximum product protection. Now, the speed of the F1 makes it possible for packing to keep pace with fast, large volume production.

Your Acme Idea Man has countless strapping ideas that point the way to profitable production line packaging. He will gladly and without obligation analyze your operations. He will demonstrate and recommend. Call him at the Acme Steel office listed in your classified directory. Or write Dept. HJ-115 for further information.

ACME STEEL PRODUCTS DIVISION

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"MECHANIZE" YOUR MATERIAL HANDLING with these modern time and cost-savers



NOW...LIGHT...easy to move **ALUMINUM ROLLER CONVEYOR**

For portable use anywhere—on shipping platform, aboard a truck, in the warehouse, at spot locations in your plant. Made entirely of heavy duty aluminum, except for steel ball bearings. Capacity 50 lbs. per lineal ft., when supported at 10 ft. centers. Available in 5 ft.—10 ft.—and larger sections if required; 45° and 90° curves also available. Write Dept. WI-115 for Bulletin 63-E.



Lift . . . Lower . . . Convey with a *Standard* **UTILITY BELT-VEYOR**

• Move packages and commodities from basement to first floor—or any floor to floor—or convey horizontally. Continuous automatic electric motor operation. A compact, pre-engineered unit, easy to install (over existing stairways where practical). Handles articles weighing up to 150 lbs. Available in 5 belt widths—10, 14, 16, 20 and 24 inch. Write for Bulletin 63-E—address Dept. WI-115.

STANDARD CONVEYOR COMPANY
General Offices: North St. Paul 9, Minn.
Sales and Service in Principal Cities

Send for Bulletin 63-D describing
Standard's gravity and power
conveyor units. Address Dept. WI-115



... for more details, circle No. 50

Methods of applying strip-chart recorders

New bulletin has 12 pages of information on 6-in. strip-chart recorders for pressure, liquid level, temperature, flow, and mechanical motion. Installation drawings and photographs show instruments at work recording different types of variables. *Bristol Co.*

... for your copy circle No. 171

Standby power

"When power fails" is a new booklet (D544) which tells how to forestall loss and danger from electric failure caused by storms or mechanical breakdown, by installing standby power units now. Photographs show applications of Cat electric sets in many types of plants. *Caterpillar Tractor Co.*

... for your copy circle No. 172

Automatic air drills

Advantages of Aro automatic drills are set forth in this 4-page folder, which gives technical specifications and application data. *Aro Equipment Corp.*

... for your copy circle No. 173

60-page handbook on wire rope slings

Union Wire Rope Corp. now offers the 1955 expanded edition of its sling handbook, with 60 pages of illustrations, charts, and diagrams describing 16 different types of slings and over 20 standard fittings for slings. Several of the slings and many of the fittings are of new design and construction. Handbook contains as extra features a complete rigger's manual, shop chart of proof tested ratings for Tuffy slings, and standard signals for directing operations of cranes, derricks, and locomotives. *Union Wire Rope Corp.*

... for your copy circle No. 174

Hydraulic ramp

Folder explains just how Cemco Hydraul-Ramp operates, eliminating dock-plates and saving time in loading platform operations. Sketches show design features and tell how ramp is installed. *Cemco Industries, Inc.*

... for your copy circle No. 175

REPAIR CONCRETE FLOORS

AND USE THEM IN 45 MINUTES

WITH **Kwik-Roc!**

Now you can repair cracks and holes in concrete floors while the plant is out to lunch. Use KWIK-ROC. It makes a floor patch that sets to rock-like hardness within 45 minutes of application. No need to hold up or detour plant traffic. When lunch is over it's all ready to use and abuse. Write Dept. H8-1156 for prices and detailed information.



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... for more details, circle No. 51 on Reader Service Postcard
WESTERN INDUSTRY — November 1955

Functions of electric proportional controllers

Foxboro's complete line of electric proportional controllers is described in Bulletin 4-11, and the three types of electrical control are explained: proportional plus manual reset, proportional plus automatic reset, and proportional-set average-position. Instruments are used for control of dew point, pressure, temperature, etc., in batch process, combustion atmosphere, and heat treating furnace applications. Illustrated with typical installation photographs. *Foxboro Co.*

... for your copy circle No. 176

Heavy-duty industrial fans

Performance data are given for each of 45 different direct-drive fan units, relative quietness levels explained, and installation drawings included, in a new catalog (Bulletin 6514) describing Model K Ventura fans, new line for industrial heavy-duty exhaust applications. *American Blower Corp.*

... for your copy circle No. 177

For tool steel users . . .

Bearcat, a general purpose tool steel, is the subject of this folder, which is brief but informative. Photographs of short-run dies, rivet sets, moil points and hot headers, stamps, punches, and master hobs show range of applications for Bearcat. Text covers typical analysis, characteristics, heat treatment. *Bethlehem Pacific Coast Steel Co.*

... for your copy circle No. 178

Data sheet on tough but lightweight plant receptacles

Hard vulcanized fibre janitorial barrels, enameled on the outside and smooth as glass inside, are detailed in this sheet, which points out advantages as receptacle for raw materials, work-in-process, finished products, or waste. *Fibre Specialty Div., National Vulcanized Fibre Co.*

... for your copy circle No. 179

Overhead cranes and automation

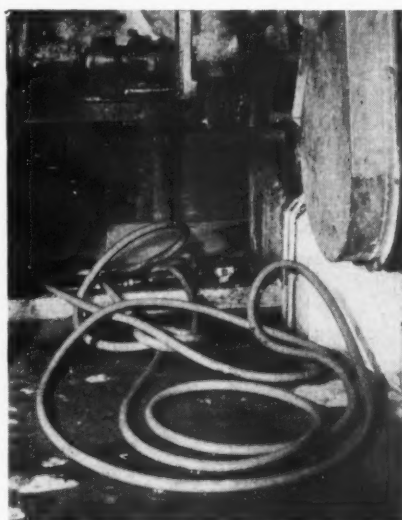
"Planning the crane for its use in automation" is the title of this new booklet adapted from a discussion by R. W. Roberts of the Whiting Corp. before an A.M.H.S. meeting. Examples are given of crane applications in many different industries, with illustrations. Bulletin M-30, 12 pages. *Whiting Corp.*

... for your copy circle No. 180

GOODALL *Demonstrates* the Economy of **QUALITY** *in Every-Day Service...*

AIR HOSE ... for All Pneumatic Tools

The Goodall line includes Air Hose of various styles in wrapped duck, molded-and-braided and sheeting constructions . . . covering the full range of pneumatic tool applications . . . from chipping to heavy-duty rock drilling. "Subway," "Mine King," "37" and "Chipper" are names that mean *maximum* in every characteristic desirable under the service conditions for which each brand is designed.



WATER HOSE For Production and Wash-up

Name any application for Water Hose, and you'll find a Goodall brand that will fill the bill with outstanding reliability and economy. "Buckskin" and "Bellwood" will meet practically all cold-water requirements. Use "Cloverleaf" Creamery Hose for scalding water wash-up. Other special-purpose constructions include Paper Mill, Greenhouse, Street and Sewer Flushing, Car Wash and Deck Hose.

Contact the nearest Goodall branch for complete information on the hose mentioned above; additional brands in the same categories; or any other industrial rubber products you may need—welding, steam, acid, oil or fire hose; conveyor, transmission or elevator belting; expansion joints; packings; corrosion-resistant linings; clothing, gloves and footwear.



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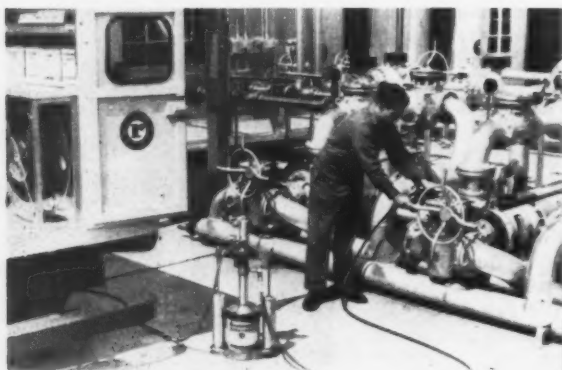
... for more details, circle No. 52 on Reader Service Postcard

NEW EQUIPMENT for Western plant operation, production, and maintenance

USE RIP-OUT POSTCARD, page 71, for more information on products described

LUBRICANT GUN

... self-primed by special air motor



New compact, lightweight, air-operated lubricating gun is recommended for large-scale valve lubricating in refineries, compressor stations, cycling plants, as well as general field and plant maintenance needs. Called the "Hypregun," it weighs only 39 lb., and operates on air pressure up to 150 psi., uses 5-qt. lubricant cans which are loaded directly into gun, eliminating all manual handling of lubricant. *Meter and Valve Division, Rockwell Manufacturing Co.*

... for more details, circle No. 181 on postcard

AIR POWERED TOOL

... automatically tensions, seals, cuts



This is said to be the first air-powered strapping unit that automatically tensions steel strapping, eliminating the major cause of operator fatigue. Predetermined tension may be adjusted up to 1,600 lb.; permits fast, efficient strapping of skid and pallet loads. Model AP is only a few pounds heavier than a hand-operated seal feed tool. Unit has been field tested in paper, lumber, brick, steel fabricating, and aircraft industries. *Signode Steel Strapping Co.*

... for more details, circle No. 182 on postcard

PLASTIC PIPE

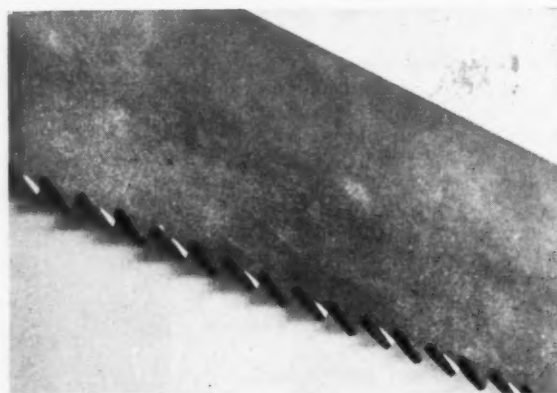
... National Tube manufactures "PVC"

Polyvinyl chloride pipe, the "stainless" of plastics, is resistant to acids, alkalis, salt solutions, alcohols, and most other chemicals. It is non-toxic and will not impart foreign tastes or odors to liquids used for human consumption. Other advantages are ease of installation, ease of applying fittings, weather resistance. Two types of rigid PVC pipe, normal and high impact, are now being extruded and are available for nationwide distribution. *National Tube Div. of United States Steel Corp.*

... for more details, circle No. 183 on postcard

POWER HACKSAW BLADE

... has chamfered teeth for precision cutting



New development, the Atkins "Chamfer-Tooth" blade, is a contribution to precision cutting, offering such advantages as: straight cuts with no wandering off cut line; longer life, with teeth not dulling off or rounding quickly; less breakage, since new style teeth can take greater load; smoother cuts, because teeth actually mill as they cut. The new teeth cut uniformly curled chips, not dust. Available in all standard 3-, 4-, and 6-tooth sizes. *Atkins Saw Div., Borg-Warner Corp.*

... for more details, circle No. 184 on postcard

SEALED-IN COLOR FOR ALUMINUM

... available in sheet, tube, extruded shapes, and fasteners

Blue, green, yellow, gray, brown, gold, and black metallic finishes can now be ordered direct from mill on sheet, extruded shapes, rod, bar, and on drawn and extruded tube aluminum. Shade variations of standard colors are available on special order. Two general classes of color anodized finish are offered: Alcoa's decorative color finish (for both indoor and outdoor use) and Alcoa's architectural color finish (for hard-weathering outdoor use). *Aluminum Co. of America*

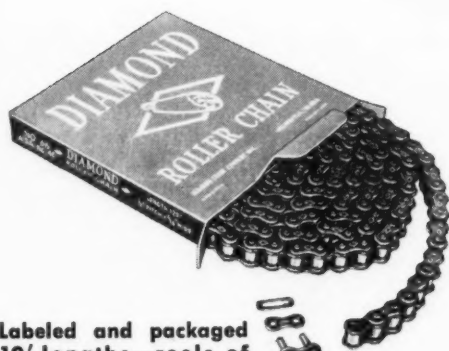
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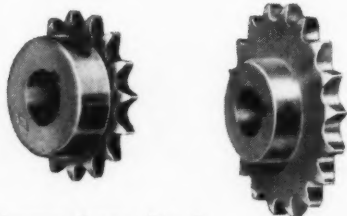


Labeled and packaged
10' lengths—reels of
50' or more.

ROLLER CHAIN AND SPROCKETS

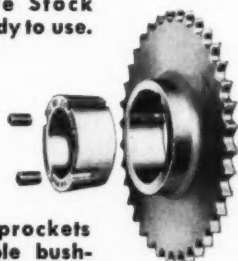
The Stock assortment of minimum bore Stock Sprockets for reborring, finished bore Stock Sprockets, and Taper lock bushed Stock Sprockets with wide range of Stock Bores give you all you need to meet most power transfer conditions.

Save time, save costs of reworking sprockets—with *stock* Diamond Roller Chains and Sprockets . . . See your Distributor. Write for Catalog 754.



Minimum bore Stock
Sprockets for reboring.

Finished bore Stock
Sprockets—ready to use.



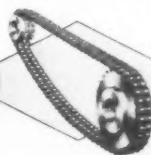
Taper lock Sprockets
with replaceable bush-
ings to fit wide range of
bores.



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Where High Quality is Traditional

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DIAMOND



ROLLER
CHAINS

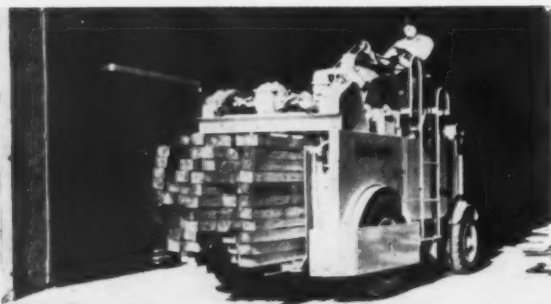
Offices and Distributors in All Principal Cities

Please refer to the classified section of your local telephone directory
under the heading CHAINS or CHAINS-ROLLER

. . . for more details, circle No. 53 on Reader Service Postcard

STRADDLE CARRIER

... carries 10,000 lb., lifts in 2.8 sec.

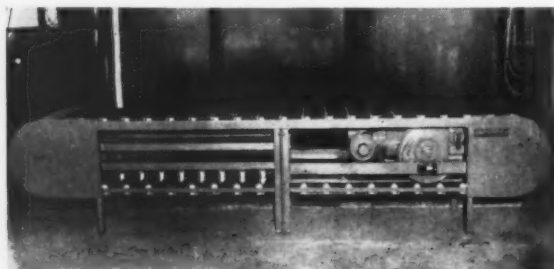


First carrier designed with 10,000-lb. rated capacity, Series 71 machine features also syncromesh transmission (three speeds both forward and reverse, with remote shifting linkage eliminated and control levers of the direct type); hydraulic control of load hooks (with hoist mechanism consisting of a simple lever and link system actuated by a double-acting hydraulic cylinder, and hoist speed of 2.8 sec., 50% faster than previous model); and radi-arc steering for what is claimed to be the shortest turning radius of any carrier now available. Available in nine models capable of carrying loads ranging from 42 to 54 in. in height, 40 to 52 in. in width. *Ross Carrier Div., Clark Equipment Co.*

... for more details, circle No. 186 on postcard

STEEL BELT CONVEYOR

... for heavy, rough jobs



Speed ratio of 3 to 1 is accomplished by variable speed drive pulleys on this new variable speed steel belt conveyor. Speeds up to 100 ft. per min. may be obtained. Company recommends use in heavy capacities, up to 300 lb. per sq. ft., and under severe operating conditions. Conveyor can be designed to move horizontally or at an angle for floor-to-floor materials handling. *West Bend Equipment Corp.*

... for more details, circle No. 187 on postcard

RATCHET LEVER HOISTS

... new design uses levers, not gears

More efficient, more compact, lighter in weight and safer are the claims made for two new coil chain ratchet lever hoists introduced by Coffing Hoist. Model L-1½ (capacity 1½ tons) and Model LD-3 (capacity 3 tons) are newest in company's Super Power line, which also includes 2½-ton and 5-ton models. Compound leverage action of Super Power reduces number of gears and chains necessary to lift load, and parts are larger and stronger, providing a safety factor of five in load-holding parts. *Coffing Hoist Division, Duff-Norton Co.*

... for more details, circle No. 188 on postcard

ALUMINUM STRIPPER

... "Take it off" painlessly

Stripping of zinc chromate primers from aluminum is a delicate job. Material that would strip would adversely affect the aluminum surface; the material that would be safe would not do a good stripping job. Oakite stripper No. 110 might be the answer. It's a two-phase solvent material to be used full strength. *Oakite Products, Inc.*

... for more details, circle No. 189 on postcard

SMALL BARREL FINISHING UNIT

... self-contained, all-in-one "Space-Miser"



Actual floor space required for the Space-Miser is 40 x 26 in., with an overall height of 48 in. and work level of 34 in. Barrel is available in one or two compartment models. Sump settling drawer connects with ordinary drain and eliminates need of sump outlet in floor. *Speed-D-Burr Corp.*

... for more details, circle No. 190 on postcard

COLD CURING AGENT

... as low as 35 deg. F.

Shell's new curing agent extends the use of catalyzed Epon resin paints, especially under adverse weather. Paints cured at room temperature exhibit film properties of chemical and physical resistance ordinarily achieved only in baked surface coatings. Bulletin SC: 55-32 gives details. *Shell Chemical Corp.*

... for more details, circle No. 191 on postcard

INDUSTRIAL LOADER

... new, larger 2-wheel drive "Payloader"



Model "HAH" Hough Payloader, with a struck capacity of ¾ yd. and a heaped capacity of 1 yd., incorporates all of the features of the smaller "HA" model introduced earlier this year after three years of development and testing. Of particular interest to Western industrial users is the bucket breakout action which permits 40 deg. of tip-back at ground level. New model has a breakout force of 4,500 lb., lifting capacity of 4,000 lb., and carrying capacity of 3,000 lb. at 4 mph. High lift of 7 ft. 9 in. makes it easy to load trucks or elevated hoppers. Torque-converter drive and 4-speed full-reversing transmission are combined with 57-hp. gas engine to provide travel speeds up to 14 mph. in forward and up to 23 mph. in reverse. *The Frank G. Hough Co.*

... for more details, circle No. 192 on postcard



A pencil pokes through this corroded metal! Why chance trouble like this? Cathodic Protection and Anaconda Type CP Cable effectively check corrosion of buried metals.

CHECK CORROSION by cathodic protection with Anaconda Type CP Cable

Corrosion of buried metals costs industry over a *billion dollars a year!*

But most of this can now be prevented—by Cathodic Protection.

Corrosion—caused by minute electric currents flowing from metal into adjacent soil—is checked by applying direct current from an external source. This eliminates anodic areas, makes the entire metal surface cathodic and stops the flow of current from the metal.

But moisture, oil, acids and alkalis

* Reg. U. S. Pat. Off.

often found in corrosive soil areas are tough on cable.

Because of our many years of experience with buried cable, Anaconda has been able to produce a new Type CP cable — specially designed with double jacket of polyethylene and Densheath* (PVC) — to resist these enemies of cable life. This means less replacement . . . major savings in both labor and material costs.

Would you like more information on how Cathodic Protection checks

corrosion? . . . and detailed information on Anaconda Type CP Cable? Ask the Man from Anaconda — or send for bulletin DM 5450, "Anaconda Cathodic Protection Cable." Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

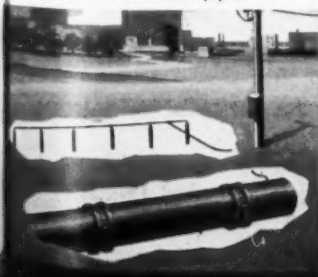
65340

ANACONDA®
COPPER AND ALUMINUM
WIRE AND CABLE

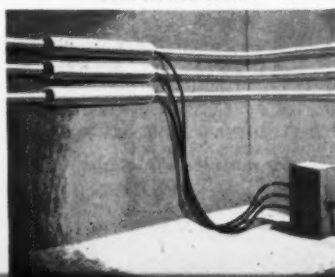
FASTEST WESTERN SERVICE—Anaconda's Western Distributors and expanded and modernized Orange, California mill which fabricates copper and aluminum wire and cable for *every kind of application* assure West fastest possible service on all needs. See Anaconda Sales Offices: Los Angeles, San Francisco, Seattle.

Where Anaconda Type CP Cable and Cathodic Protection Cut Corrosion Costs.

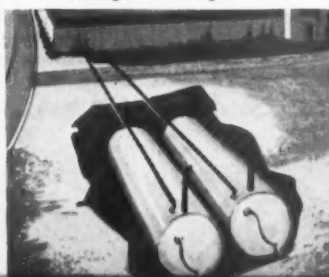
Gas mains and water pipes



Lead-covered cable



Underground storage tanks

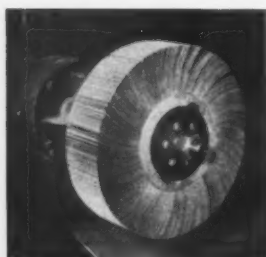


Transmission towers



POLISHING AND GRINDING WHEEL

... new method for polishing all metals



This wheel is formed from hundreds of pieces of cloth-coated abrasives, giving it an unusual ability to conform. Other qualities claimed are constant rate of cut from the beginning of a new wheel until it is worn down to the hub, and abrading-polishing action that enables it to remove mild draw marks in the same

process in which it produces a buff-type finish. Wheel can be used on rotary or straight line automatics, or on standard lathes for hand operation. Economies in actual test: one plant cut its polishing costs by one-fifth. Available in 20 stock sizes. *Minnesota Mining and Manufacturing Co.*

... for more details, circle No. 193 on postcard

CUSHIONING MATERIAL

... for shipping instruments and machinery

New Fiberglas package cushioning has these advantages because it is inorganic: it will not mildew or rot, is fire safe, odorless, and moisture resistant. Material retains its original resiliency, is available in variable thicknesses and has a wide range of densities to 30 lb. per cubic foot. Meets military specifications Mil-C-17435A and Mil-C-4694. *Owens-Corning Fiberglas Corp.*

... for more details, circle No. 194 on postcard

PROTECTIVE COATING

... "galvanizing" with brush or spray

Dimetecote is a new inorganic, metallic zinc coating containing no oils or resins that is said to give existing steel structures the same protection as galvanizing. Coating has been tested on structural steel, floating roof tanks, marine drilling towers, ship decks, and dam gates. Cost is reportedly less than 6¢ per square foot. *Amercoat Corp.*

... for more details, circle No. 195 on postcard

PORTABLE ELECTRIC TOOL

... combines jig-saw, router, jointer, and shaper table



Model 140 Routo-Jig is a compact new electric tool especially adaptable to industrial maintenance work, because it can handle most repair and woodworking problems. It can cut out sections of wallboard or baseboard for conduit, pipes, and vents with no need for preliminary drilling of hole or final filing and sanding.

Other uses: erecting partitions, duplicating present moldings or baseboard, and—used with shaper table—cutting tongue and groove. Dimensions $4\frac{3}{4} \times 6\frac{1}{2}$ in. *Porter-Cable Machine Co.*

... for more details, circle No. 196 on postcard

J. Barth & Co.

... prefers
the *flexible*
health plan

Since the investment and brokerage firm of J. Barth & Co. was founded in 1883, it has been an important factor in the financial and industrial progress of California. This company, with offices in San Francisco, Los Angeles and New York, is a member of the stock exchange in each of these cities.

Barth employees have the satisfaction of knowing that their firm is one of more than 10,000 California groups enjoying the protection of a CPS-Blue Shield health plan. From your broker or the nearest CPS office, find out how your firm can have a plan designed to meet its exact needs.



CALIFORNIA PHYSICIANS' SERVICE

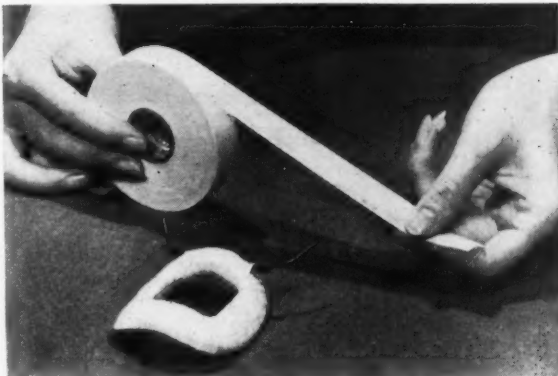
Blue Shield®

431 S. FAIRFAX AVENUE, LOS ANGELES • 450 MISSION STREET, SAN FRANCISCO
And Offices in Sixteen Other Principal California Cities

... for more details, circle No. 55 on Reader Service Postcard
WESTERN INDUSTRY — November 1955

POLYESTER WEB

... for wrapping coils, motors, transformers



New felted material is said by manufacturer to have greater moisture resistance, better varnish pickup ability, and greater conformability than conventional cotton, glass, or synthetic cloths. Fabricated from polyester fibers, non-woven and non-raveling, new material permits rapid and complete impregnation, and conforms snugly to irregular shapes without pulling apart or slipping. Designated Scotch brand polyester web, available in white. *Minnesota Mining and Manufacturing Co.*

... for more details, circle No. 197 on postcard

PURE ALUMINUM

... in pigs or foil

Super purity aluminum pig, containing 99.99 per cent or more aluminum, is now being produced in commercial quantities at the Mead, Wash., plant of Kaiser. The super purity metal will be rolled into foil of 99.97 per cent purity at the Permanente, Calif., works for the electronics industry, and will also be made available in pig form. *Kaiser Aluminum & Chemical Corp.*

... for more details, circle No. 198 on postcard

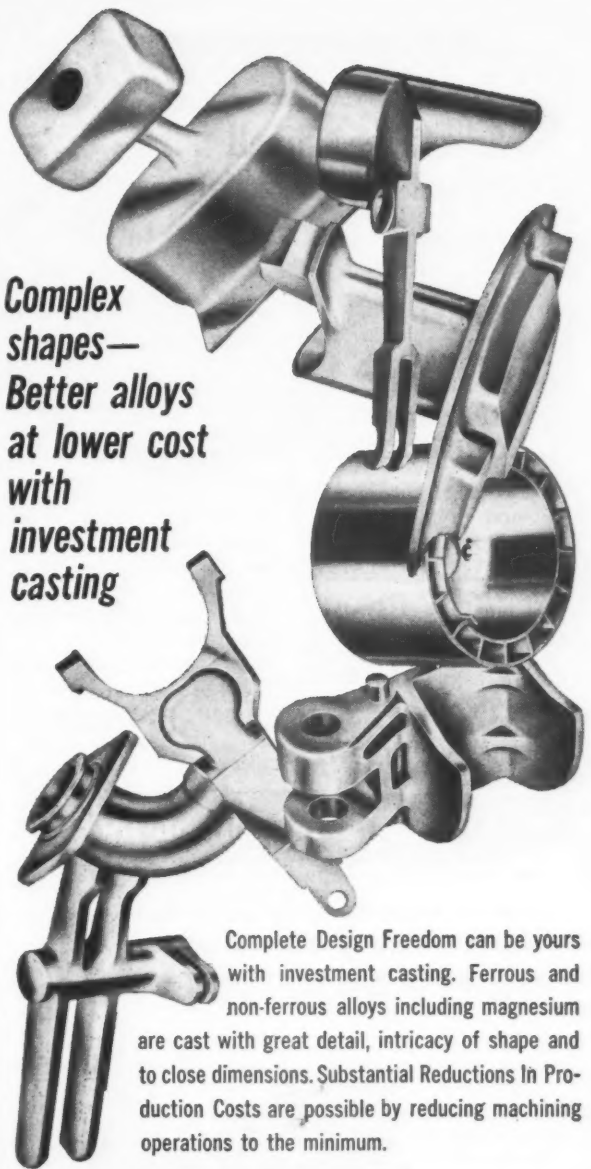
PORTABLE WORK LAMPS

... safe lighting for the dark spots



Here is a fluorescent portable lamp designed to meet the special needs of industry: glare-proof light; water and vapor tight for use in hazardous locations; cool, easy to handle, easy to hook on, and rugged. Two new units, 15 and 30 watt sizes, are now available where more light is needed to cover larger areas. At left, portable lamp is shown in use on a machine tool set-up operation. *Day-Ray Products, Inc.*

... for more details, circle No. 199 on postcard



**Complex shapes—
Better alloys
at lower cost
with
investment
casting**

Complete Design Freedom can be yours with investment casting. Ferrous and non-ferrous alloys including magnesium are cast with great detail, intricacy of shape and to close dimensions. Substantial Reductions In Production Costs are possible by reducing machining operations to the minimum.

- Assembly costs are cut by combining two or more components into an integral casting
- Large and small quantity production (including prototypes) are cast economically
- Tooling costs are relatively low

Arwood's four plants have complete tooling facilities and government approved inspection equipment.

If you use metal in your business investigate the possibilities of investment casting . . . send for literature or call for consultation. We welcome parts or prints.

ARWOOD

PRECISION CASTING CORP.

3037B S. Vail Ave., Los Angeles 22, Cal. ● Phone. RAymond 3-5361

OTHER WESTERN SALES OFFICES:

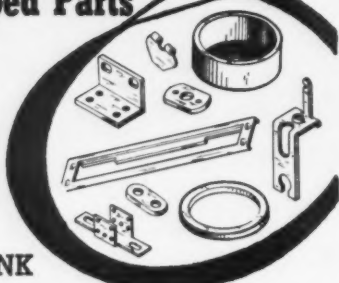
STANDARD PARTS & EQUIP.	● 219-21 Ninth Street, San Francisco 3, Calif.
DEAN LEWIS ASSOCIATES	● 110 Administration Building, Seattle, Wash.
THE HOUSTON COMPANY	● 904 Main—P.O. Box 4506, Ft. Worth, Texas

... for more details, circle No. 56 on Reader Service Postcard

TEMPORARY TOOLING

Specialized Small
Irregular Shaped Parts

- ☒ STAMPED
- ☒ FORMED
- ☒ PIERCED
- ☒ EXTRUDED
- ☒ STENCILLED
- ☒ TAPPED
- ☒ COUNTERSUNK



Years of tooling experience, combined with modern machines has proven over the past 20 years that the temporary die method is the most economical for model work and small production runs.

NOW SERVING
THE WESTERN STATES



2231 CHICO STREET
EL MONTE, CALIF.
(A Suburb of Los Angeles)

Send prints for firm quotation
and detailed cost comparison.

MAIL PRINTS TODAY!

or Call
CUMBERLAND 3-4109

STAMPINGS in SMALL LOTS

... for more details, circle No. 57 on Reader Service Postcard

Year in, year out DEPENDABILITY



—with

BLACKMER rotary pumps

Cut maintenance costs and delays due to pump failures through these outstanding features:

- self-adjusting for wear vane construction
- replaceable vanes and liner
- self-priming with high suction lift
- wide range of applications



liquid materials handling®

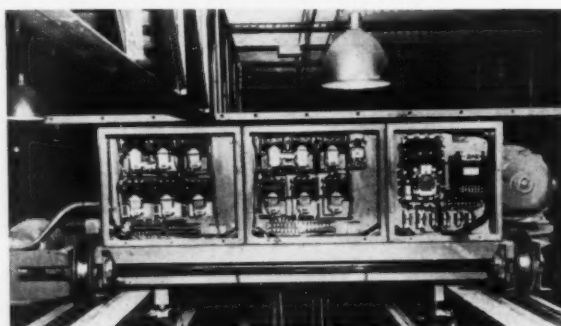
BLACKMER

Industrial, Hand and Truck Pumps, Strainers, Pressure Control Valves
BLACKMER PUMP COMPANY, GRAND RAPIDS 9, MICH.
DIVISION SALES OFFICES — NEW YORK • ATLANTA • CHICAGO
GRAND RAPIDS • DALLAS • WASHINGTON • SAN FRANCISCO
See Yellow pages for your local sales representative

... for more details, circle No. 58 on Reader Service Postcard

CRANE CONTROL

... converts cranes to pendant operation

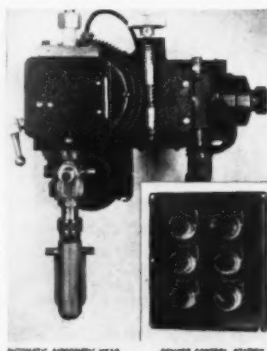


Trolley, bridge, and hoist controls can be mounted in a group, as shown here, or individually on this new light industrial crane control, which was developed to convert infrequently used cranes from cab to pendant operation. Flexibility, low cost, and ease of maintenance are advantages stated for the new unit. *Westinghouse Electric Corp.*

... for more details, circle No. 200 on postcard

AUTOMATIC WELDING HEAD

... low price because of single motor drive



AUTOMATIC AIRCOMATIC HEAD

REMOTE CONTROL STATION

Advances in welding process and development of constant potential power supply units have made possible single motor drive used in this new automatic Aircomatic welding head. It is designed for applications using the Aircomatic process, Airco's inert gas consumable electrode method. Simplified controls; continuous current rating of 600 amp. *Air Reduction Pacific Co.*

... for more details, circle No. 201 on postcard

RUBBER DRUM TILTER

... eliminates spillage and waste

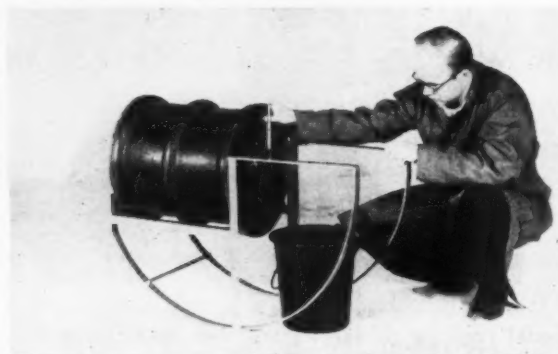
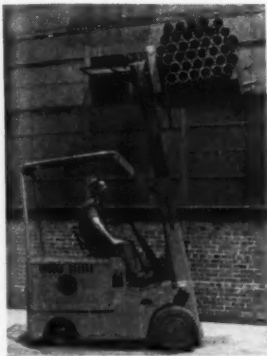


Figure 522 tilter is especially designed for pouring from rubber drums used for chemicals and solvents. Controlled pouring eliminates spillage and waste. Standard size fits 13-gal. drums; available for other size drums. Circular gives details. *Nutting Truck and Caster Co.*

... for more details, circle No. 202 on postcard

ELECTRIC FORK TRUCKS

... new line is easier to operate,
has full year's warranty



High maneuverability, ease of maintenance, and increased operator comfort and convenience are claimed for new Model FT line of Baker-Raulang electric fork trucks, which includes 3,000, 4,000, and 6,000 lb. units. FT trucks have no cowl, permitting operator to see load and floor immediately ahead, and making it easier for him to get off and on truck. Three braking systems: wheel, parking, and dynamic braking. *Baker-Raulang Co.*

... for more details, circle No. 203 on postcard

DUAL-PURPOSE WIRING

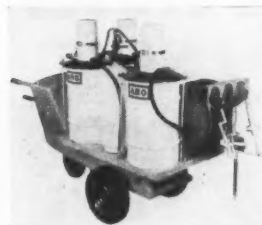
... simplifies stockroom problems

Densheath 900, new coated copper conductor, can be used both as a building wire and a machine tool or appliance wire. Insulation is an oil and moisture resistant 90-deg. C compound and slipper compound overall to insure ease of pulling in conduits. Wire is rated at 600 v. *Anaconda Wire and Cable Co.*

... for more details, circle No. 204 on postcard

PORTABLE POWER LUBRICATOR

... self-propelled, self-powered lubrication

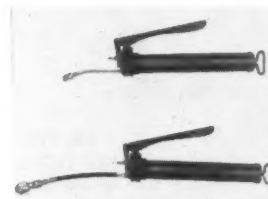


and the like. Turning radius is 33 in. *Aro Equipment Corp.*

... for more details, circle No. 205 on postcard

LEVER-TYPE GREASE GUNS

... carry super volume, at up
to 2,500 lb. pressure



Two new lever guns come equipped with rigid hydraulic coupler extension for hydraulic fittings, or flexible 12-in. whip hose extension with button head coupler for button head grease fittings. Performance is said to be .17 oz. per stroke, or 6 strokes per oz., of No. 1 cup grease at 70 deg. F. *Lincoln Engineering Co.*

... for more details, circle No. 206 on postcard

Will your company's private communications

meet your needs next year?

Whether it's radio telephone, Teletype, private line telephone or signal and control channels, new equipment and techniques are constantly being developed to meet your communications requirements. So, why invest heavily in a privately owned system that may not meet your needs in a few years?

Private communications arrangements furnished by Pacific Telephone are tailored to your needs— yours alone. And they can easily be rearranged if your requirements change. You can forget about the worries of idle equipment, depreciation and obsolescence.

Let a Pacific Telephone communications specialist analyze your complete communications requirements. His professional advice is free. And it's based on 75 years of communications leadership.



Pacific Telephone

... for more details, circle No. 59 on Reader Service Postcard

SURETY SURESEAL INDUSTRIAL GLOVES



**SAVE
1/3 ON
GLOVE
COSTS**

... says one of the many glove users who tell us of big savings when they switch to Sureseal.

Because Surety's Sureseal synthetic has 4 times greater snag resistance and 10 times greater abrasion resistance, as well as resistance to practically all industrial chemicals, you can expect similar savings on most jobs when you change to Sureseal.

For all the facts, send for new Sureseal bulletin.



THE
SURETY
RUBBER CO.
Carrollton, Ohio

2 WAY PROTECTION TOO, WITH TURN-CUFFS
Cuffs up ... liquids can't run down arm or into glove. Cuffs down ... give added inches of arm protection.

WESTERN DIVISION: 544 Market St., San Francisco 4, California
... for more details, circle No. 60 on Reader Service Postcard

What is your sealing problem?

*Chances are, one of Presstite's
Permagum sealers will solve it!*

Permagum sealers are non-staining, non-drying, permanently soft compounds that *seal tight and stay tight*. Their stability at high temperatures, lack of odor, ability to remain soft and pliable at extremely low temperatures, and effectiveness in sealing out moisture, make them particularly suited for refrigeration sealing. However, they are also widely used in automobiles, railroad cars, trucks, trailers, prefabricated houses, aluminum window frames ... wherever wind, dust, moisture, must be sealed out.

Available in beads, ribbons, tapes, or special shapes for easy application. Call for complete information today.



THE
**HUBBARD
COMPANY**

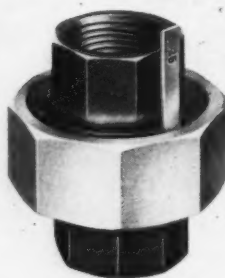
4809 East 49th Street, Los Angeles 58, California. Logan 8-3136
SAN DIEGO—Glencourt 4-1659 SAN FRANCISCO—Underhill 3-0288

... for more details, circle No. 61 on Reader Service Postcard

86

EASY-TO-IDENTIFY ORIFICE UNION

... for instrumentation, process control piping



New 3,000-lb. "Tab Orifice Union" has orifice stamped on a tab that protrudes through a slot in the end piece of the union, with tab being an integral part of the stainless steel orifice plate. Thus, errors in orifice plate identification are eliminated. Orifice plate is easily removed when it is desired to change flow conditions.

Connecting pipes need not be pulled back any farther than required to slip the plate from between the two union ends. Data Sheet SU-1 gives sizes, dimensions, and price information. *Watson-Stullman Fittings Div., H. K. Porter Co.*

... for more details, circle No. 207 on postcard

FRACTIONAL HORSEPOWER MOTOR

... for use in dusty, fume-laden locations



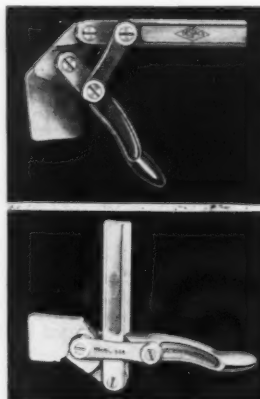
Century Electric has added a fractional horsepower motor to its totally enclosed fan cooled motor line, now available in from 1/2 to 100 hp. Shown here is new 1/2 hp. motor which has aluminum rotor and ventilating fan integrally cast, and six layer insulation for

stator windings. Can be mechanically modified for bolting to machine. *Century Electric Co.*

... for more details, circle No. 208 on postcard

TOGGLE CLAMPS

... for vise-like holding pressures



These two heavy-duty DE-STA-CO Titan toggle clamps are designed for rugged work but easy maintenance. Completely replaceable parts, forged alloy-steel components, holding pressures up to 4,000 lb., and weight 4 1/2 lb., two models differ only in purpose. Model 557 (top) is recommended where overhead clearance is limited, and Model 558 (bottom) where clearance allows use of upright handle. *Detroit Stamping Co.*

... for more details, circle No. 209 on postcard

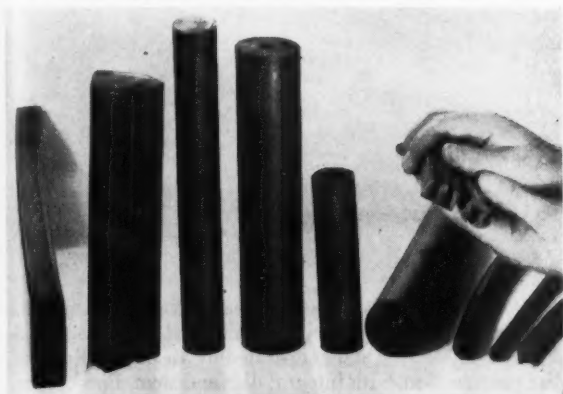
METAL CLEANER COMPOUNDS

... for mechanical spray washing

Two new washing compounds are introduced by Detrex Corp.: No. 58, for ferrous metals, which contains sequestering agents to overcome hard water conditions without excessive foaming; and No. 59, for non-ferrous metals, which eliminates etching and reduces tarnish. Literature is available from company. *Detrex Corp.*

... for more details, circle No. 210 on postcard

... new process molds them "by the mile"



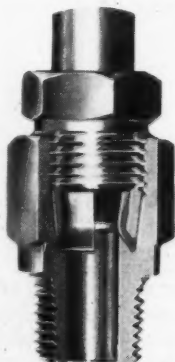
... for more details, circle No. 211 on postcard

... handles materials at rates to 45 tph.



... for more details, circle No. 212 on postcard

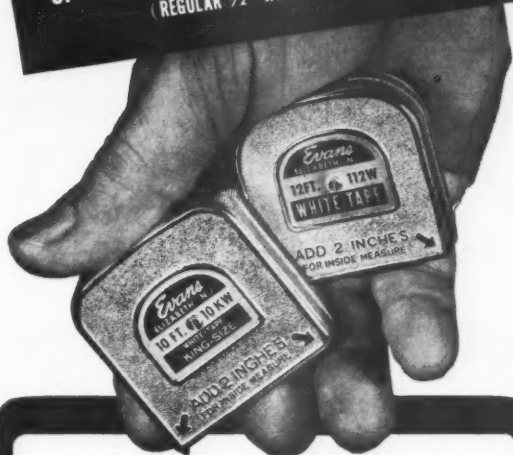
. . . pressure tight without special tools



... for more details, circle No. 213 on postcard

FREE!

FREE Your Choice...
Evans **KING SIZE** 10-ft. White-Tape
(EXTRA-WIDE BLADE)
or Evans **Pocket** 12-ft. White-Tape
(REGULAR 1/2" WIDE BLADE)



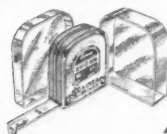
We feel that once you try Evans Tapes, you'll never buy another brand. Here's why:

Also available in 6, 8, 12-ft. lengths.

10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Work in feet and inches? Read Here

Work in inches? Read Here



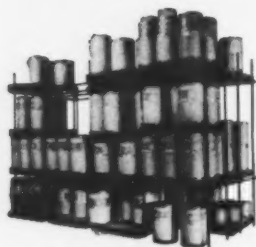
Also available in 6, 8, and 10-ft. lengths.

1 _____
2 _____
Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____

87

YES! You CAN build your own STORAGE RACKS

AT
LOW COST



WITH
**TUBE
STRUT
CLAMPS**

A strong and economical rack with
TUBE-STRUT clamps and your own
pipe. Write for details.

TUBE-STRUT DIVISION
TUBULAR STRUCTURES CORP. OF AMERICA
3129 RIVERSIDE DRIVE
LOS ANGELES 27, CALIFORNIA

... for more details, circle No. 63 on Reader Service Postcard

Call Nutting For TRUCKS WHEELS CASTERS



FIG. 1432
Heavy duty bar handle
platform truck



FIG. 1011
Balance-type platform
stake truck



FIG. 1152 DPL
Light weight 2-wheel
utility truck



FIG. 18
Western Pattern
with Steam Bent Handles



FIG. 215
Golden Gate Pattern

WEST COAST REPRESENTATIVES

DENVER
McDonald-Hunt Scale &
Supply Co., 1548 Wazee St.

LOS ANGELES
H. L. Stewart & Associates
1547 Etadillo Ave.

OAKLAND
E. C. Bushner Associates,
Inc., 351 Fifth St.

TUCSON
L. J. Clarke and Co.
2625 N. 1st Avenue

PORTLAND
F. E. Bennett Co.
426 N. W. 6th Ave.

SALT LAKE CITY
Equipment Supply Co.
16 Post Office Plaza

SEATTLE
Secord Sales Co.
95 Connecticut St.

SPOKANE
H. H. McVeigh
West 310 First Ave.

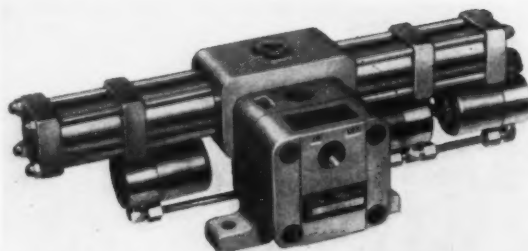
Export Sales Representative
SCHEEL
INTERNATIONAL, INC.,
4337 North Lincoln Ave.
Chicago 18, Illinois

Since 1891 **NUTTING TRUCK AND CASTER COMPANY**
1726 Division St. W., Faribault, Minn.

... for more details, circle No. 64 on Reader Service Postcard

88

POWER-OPERATED VALVE ... for automatic operation



Model PON is a standard Ledeen 4-way disc valve for air, gas, oil, or water service, controlled by a Ledeen 3-position power attachment operated by air or gas. Rotating disc construction, with integral disc and stem. Power operation to forward, reverse, and neutral. Bulletin 1010, offered by manufacturer, gives detailed information. *Ledeen Manufacturing Co.*

... for more details, circle No. 214 on postcard

LIFT TRUCKS ... with fully automatic gear shifting



New series of Yale & Towne trucks, called the KGA51 line, are equipped with Yale Torque Transmission, doing away with manual shifting of gears. Transmission automatically puts truck in most suitable ratio relative to load and speed, without engine lugging. Capacities range from 3,000 to 8,000 lb. Trucks include

all Yale & Towne standard features for operator safety and comfort. *Yale & Towne Mfg. Co.*

... for more details, circle No. 215 on postcard

COLOR FINISH FOR METAL BUILDINGS ... resists dirt, cracking, peeling, or blistering

Metal-Magic comes in ten ready-mixed colors which can be blended into new shades to meet special needs for a color finish on Butler steel buildings. Designed for use in industrial districts, this paint dries to an exceptionally tight film that resists smoke-laden air, carrying corrosive gases, acids and salt, and even some sulphuric acids. *Butler Manufacturing Co.*

... for more details, circle No. 216 on postcard

HIGH-PRESSURE HOSE ... withstands severe surge peaks



New hose for industrial hydraulic applications will take surge pressures 15 to 20% higher than standard high pressure hoses. It performs satisfactorily at 5,000 psi. in the 3/8-in. size, and at proportionate pressures in 1/2 and 3/4-in sizes. *Aeroquip Corp.*

... for more details, circle No. 217 on postcard

CUT-OFF WHEELS

... faster, cooler cut in dry operations

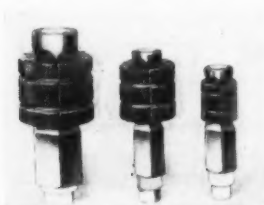


High bond strength plus freedom of cut in the new B7 line assures trouble-free operations for dry production metal cut off. Wheels have longer production life: photograph shows (l. to r.) new 16-in. B7 wheel; then B7 wheel after making 415 cuts on 1-1/8-in. diameter cold rolled steel; and then the best previous wheel after 415 cuts on same material. B7 wheel is 8 1/2 in. in diameter, whereas the best previous wheel is worn to 6 in. Available in three grades and in 24 to 120 grit. *Carborundum Co.*

... for more details, circle No. 218 on postcard

PIPE JOINING TOOL

... new grip now offered in larger sizes

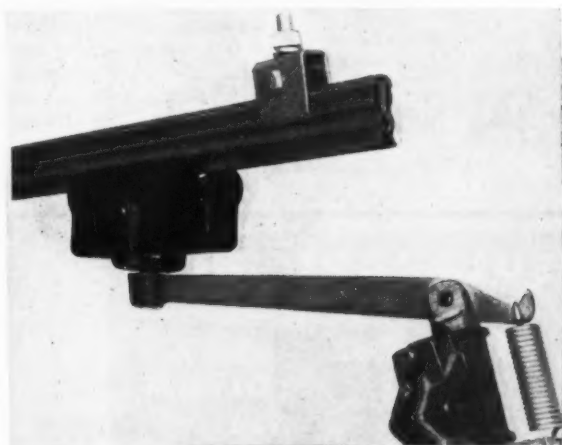


Big Boy Tube Tule is now manufactured for work on water, gas, oil, air and fluid conveying lines, with three new sizes from 2 to 4 1/2 in. I.D. (Three smaller sizes available run from 1/2 to 1 1/2 in. I.D.) Six movable segments on end of tool are expanded by hand-turning knurled head on other end, until they make inside contact, permitting even leverage and easy maneuverability of pipe or tube. Handles any type of material—metal, fiber, glass, plastic, composition—without tearing or shredding. *Double T Products Co.*

... for more details, circle No. 219 on postcard

CONDUCTOR SYSTEMS

... sure contact for cranes and hoists



Duct-O-Bar conductor systems are designed especially for crane and hoist installations requiring curves, interlocks, transfer points. T-shaped, hollow-rolled conductor gives added lateral stability. Vinyl plastic cover will not support combustion. Splicing method eliminates hot spots. Available in three amperages: 100, 175, and 300 amp. *Duct-O-Wire Co.*

... for more details, circle No. 220 on postcard

INDUSTRIAL TESTING EQUIPMENT
AND INSTRUMENTS SINCE 1919

Call **Pacific** SCIENTIFIC

PUT EXPENSIVE MACHINERY
proof
ON A SOUND FOOTING

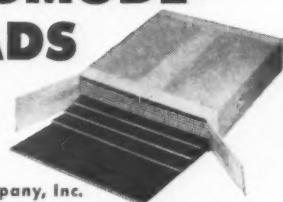


...with **ISOMODE®**
PADS

Produced by The

MB

Manufacturing Company, Inc.



Isolate Costly Vibration and Noise!

Destructive vibration can deteriorate your machines and plant equipment. Excess noise bites into the efficiency of employees. Yet, you can reduce these dangerous hazards today—simply by taking advantage of M.B. Isomode Pads.

These pads absorb and isolate noise and vibration.

Easily installed and cut to size, these efficient pads require no bolting or elaborate equipment to stay underfoot. Fabricated from du Pont Neoprene, these inexpensive pads are oil and water-resistant—last for years.

Write for detailed installation data
and prices—there's no obligation!

Pacific
SCIENTIFIC CO.

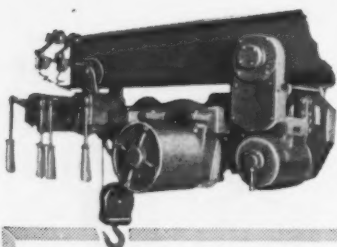
LOS ANGELES: 1430 Grande Vista Ave.
SAN FRANCISCO: 25 Stillman Street
SEATTLE: 421 Michigan Street
PORTLAND: 1218 S.E. 7th Ave.
ARLINGTON, TEXAS: 111 E. Main Street

Representing:

- Automatic Temperature Control Co.
- Cal-Tester
- Coates Electric Co.
- Welduction Corp.
- Lewis Engineering Co.
- Link Engineering Co.
- The MB Manufacturing Co.
- Partlow Corporation
- Soilttest Incorporated
- Tinius Olsen
- Testing Machine Co.
- Wilson Mechanical Instrument, and Helicoid Gage Divisions of American Chain & Cable Co.

... for more details, circle No. 65 on Reader Service Postcard

time-saving... manpower-saving



ELECTROLIFT WORM DRIVE HOIST

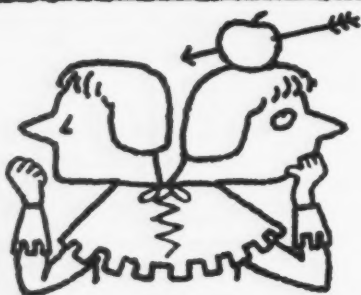
One man can handle up to six tons quickly and safely with an ElectroLift Worm Drive Hoist. A dependable, long-lasting ElectroLift Hoist pays for itself many times over, with savings in time,

power and labor. Available in a wide variety of models—trolley drive or manually operated.

For full details call your ElectroLift representative listed in the telephone directory.

ELECTROLIFT
WORM DRIVE
HOISTS

ELECTROLIFT, INC., 204 Sargeant Ave., Clifton, N. J.
... for more details, circle No. 66 on Reader Service Postcard



OFTEN TWO HEADS ARE BETTER THAN ONE

Sometimes two heads are the only solution to a part or fastener problem. Take a quick look at the belt buckle roller illustrated. The big problem here was to produce this roller in quantity, inexpensively and quickly... and HASSALL double-heading did the trick. Double-heading is only one example of the almost limitless possibilities Hassall cold-heading offers you. If you have a fastener problem just send us samples or specifications for a quotation.

WRITE FOR CATALOG... with it we will send you our popular decimal equivalent wall chart.
John Hassall, Inc., Box 2168, Westbury, L. I., N. Y.

HASSALL

SINCE
1850



NAILS, RIVETS, SCREWS
AND OTHER COLD-HEADED
FASTENERS AND SPECIALTIES

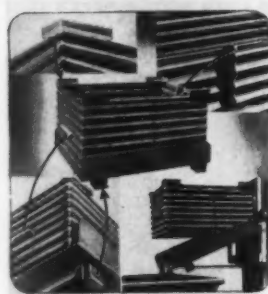
Los Angeles Representative:

C. W. Warren Co., 646 N. Fuller Avenue, Los Angeles 36, California
... for more details, circle No. 67 on Reader Service Postcard

90

DROP BOTTOM BOX

... for use in fork truck or work stand



When used on positioning stand, legs at bottom of this new box engage stand and drop bottom automatically opens to discharge materials into tray. When used for automatic dumping by fork truck, a reinforced box hanger engages mast of fork truck for materials discharge into truck or conveyor. Corrugated all-steel welded construction, with lapped end, built from any

gage steel to customer dimensions and capacity specifications. **Palmer-Shile Co.**

... for more details, circle No. 221 on postcard

VARIABLE SPEED PULLEY

... adapted for use in limited space



New 1/4-hp. variable speed pulley is designed so that it can be mounted with belt take-off close to motor, or reversed so that belt take-off is in an overhung position away from motor. Speed ratios up to 2 to 1. Dimensions 3-5/16 in. length by 3 in. diameter; weight 26 oz. **Lovejoy Flexible Coupling Co.**

... for more details, circle No. 222 on postcard

LIFT TRUCK

... maneuverable in narrow aisles



Hyster HC-50 lift truck is compact, 5,000-lb. unit with an outside turning radius of 79 in.—said to be lowest in the field—and net weight of 7,110 lb.—lightest of its capacity. Low center of gravity and comparatively long wheelbase add to operating ease. **Hyster Co.**

... for more details, circle No. 223 on postcard

SULPHURIC ACID for the west

66° BAUME 20%
98% OLEUM
and special grades

Garfield
700 PACIFIC NAT'L BLDG.
SALT LAKE CITY, UTAH

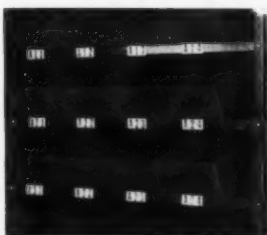
ESTABLISHED
1916

**CHEMICAL
& MFG. CORP.**

... for more details, circle No. 68 on Reader Service Postcard

WESTERN INDUSTRY — November 1955

SELF-STICKING NUMBERS AND LETTERS ... for identification, safety, maintenance



Brady numbers and letters are made of cotton cloth impregnated with a temperature-resistant pressure-sensitive adhesive, and come mounted on dispenser cards. Made in six sizes and two colors, they are recommended for marking bays, bins, columns, posts, barrels, shipping containers,

machines, and other equipment. Bulletin 165 lists numbers and letters available. Free samples. *W. H. Brady Co.*

... for more details, circle No. 224 on postcard

MOISTURE SEPARATORS ... for compressed air equipment from 10 to 250 psi.



New Series 125 piston-operated moisture separators operate efficiently and economically wherever air demand is intermittent. They do not increase air requirements and will not flutter. Four models, serving 1/4 to 1/2-in. lines. Action is fully automatic. *Wilkerson Corp.*

... for more details, circle No. 225 on postcard

How can I electroclean steel at lower cost?

How can I find a brass cleaner that gives better protection against tarnishing?

How can I reduce rejects due to faulty electrocleaning of zinc die castings?

Oakite has three good answers:

Oakite Composition No. 90 for steel
Oakite Composition No. 191 for brass
Oakite Composition No. 95 for zinc die castings

FREE For more complete answers, ask for the following booklets: 1 "Four good steps toward better electroplating on steel", 2 "What's NEW for electrocleaning brass and other copper alloys", 3 "Good news about electrocleaning zinc-base die castings". Write to Oakite Products, Inc., 1001 E. First St., Los Angeles, or 681 Market St., San Francisco, Calif.

Technical Service Representatives
Principal Cities of U. S. and Canada



... for more details, circle No. 69 on Reader Service Postcard
November 1955 — WESTERN INDUSTRY

50 YEARS GEAR SERVICE TO INDUSTRY

The More Particular You
Are In Selecting Gears,
The More Likely You Are
To Select JOHNSON

**JOHNSON GEAR
AND MANUFACTURING CO.**

8th & PARKER STREETS
BERKELEY 10, CALIFORNIA



... for more details, circle No. 70 on Reader Service Postcard



**NEW
ELPAR
FORK TRUCK**

★ 3000 lbs. Capacity
★ Electric Powered
★ Extra Maneuverability

COMPACT, EASILY STEERED—Wheelbase 42"; width 35"; 120 1/2" stacking aisle with 36" long forks. This compact size plus the new knuckle type trail axle with 75° maximum wheel turn provide easy maneuverability in narrow aisles and congested areas.

FASTER MAINTENANCE—All parts instantly accessible for lubrication or inspection. Heavy duty knuckle pin bearings, center sill frame construction, low hydraulic pressures, special E-P built motors, and double reduction drive unit are typical design features insuring low cost operation.

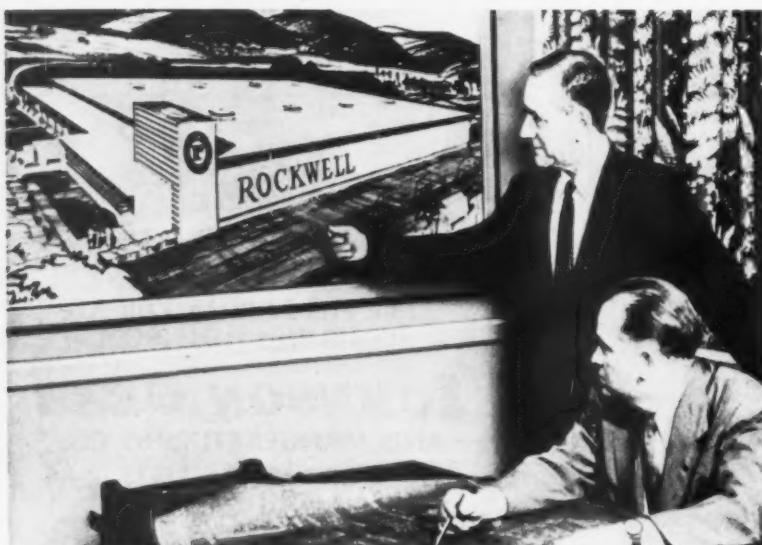
WRITE FOR ALL THE FACTS ON MODEL F-45T3

ELWELL-PARKER ELECTRIC CO. WESTERN REPRESENTATIVES:
Los Angeles . . . J. W. LAFFERTY CO., 5422 E. Washington Boulevard
San Francisco . . . IRA G. PERIN CO., 375 Howard Street
Seattle . . . COLBY STEEL & MFG. INC., 3155 Elliott Avenue

... for more details, circle No. 71 on Reader Service Postcard

TRADE WINDS

News for you about suppliers
of plant operating equipment



H. BOEZINGER (standing), Western regional manager for Rockwell Mfg. Co., and L. A. Dixon Jr., vice president, Meter and Valve Div., examine artist's sketch of Rockwell's soon-to-be-built "California-style" plant.

Rockwell plans plant in Porterville

A 100,000-sq. ft. plant at Porterville, Calif., will be built by Rockwell Manufacturing Co., with construction beginning soon and completion planned for early 1956. The \$1,000,000 structure, on a 32-acre plot, will be used for the assembly, repair, and warehousing of Rockwell meter and value products for Western distribution, and for warehousing of Rockwell-built Delta power tools for Western industries. About 50 people will be employed at the start, with this figure expected to reach 200 later.

Porterville, located in Tulare County some 160 mi. north of Los Angeles, was chosen for its favorable location near the center of Pacific Coast population, good transportation facilities, and availability of labor. The new plant will be Rockwell's second in California. According to W. F. Rockwell, Jr., president, interior facilities will be much like Rockwell's 15 other plants, but the exterior will vary considerably to conform with the "futuristic trend of modern California-style industrial architecture."

Ladish buys two Western firms

Prominent manufacturer of controlled quality drop forgings, pipe fittings, and rolled rings, Ladish Co. of Cudahy, Wis., has announced the purchase of two adjacent Los Angeles manufacturing plants: CBS Steel and Forge Co. and General Pacific Corp.

J. L. Varga, formerly of Ladish Co. of Canada, Ltd., is manager of the new plants, which will operate as Ladish Pacific Division, Ladish Co. Also moving to the new plant are H. L. Pehrson, district manager of West Coast fittings sales; G. L. Shaffer and H. Stroup, special sales representatives of the customs forging division;

and other Western staff members.

Ladish has long been a well known producer of drop forgings up to 10,000 lb. in a wide range of material specifications including titanium and high density heat resisting alloys for critical components in aircraft engines, landing gears, and plane structures as well as for construction equipment. Their line also includes a complete line of pipe fittings regardless of size, type, pressure rating, wall thickness, or material specification.

Still another product line is Ladish rectangular and contour cross section welded and seamless rolled rings.

Jorgensen Co. buys Baker Steel & Tube

Earl M. Jorgensen Co., Los Angeles, has purchased the Baker Steel & Tube Co., also of Los Angeles. The newly acquired firm specializes in distribution of seamless and welded carbon tubing, as well as aircraft and commercial alloy tubing.

Jorgensen Co. will operate the firm with no change of name or personnel. Other Jorgensen plants are located in Oakland, San Francisco, Houston, Dallas, and Tulsa. Los Angeles operations include a forge division and a slitting division.

Pheoll purchases Voi-Shan Manufacturing

Pheoll Mfg. Co., Chicago manufacturer of screws, nuts, bolts, and special fasteners, has purchased Voi-Shan Mfg. Co., Inc., of Culver City, Calif., leading producer of precision fasteners for the aircraft industry. Voi-Shan operations will continue with same plant equipment and personnel, engineering service, and management, operating as a subsidiary of Pheoll.

UTC opens Pacific division plant in L.A.

New UTC-Pacific Division plant has opened at 4008 West Jefferson Blvd. in Los Angeles for United Transformer Co., which has its main plant in New York City. New plant is fully equipped with most modern production facilities for manufacture of transformers, reactors, solenoids, variable-voltage transformers, control reactors, high-Q coils, and filters for the electronics field. Complete laboratory and test facilities are also provided for engineering staff.

New name for Western Gear

Western Gear Works has been renamed Western Gear Corp. Company, which has general offices at Lynwood and plants at Lynwood, Pasadena, Belmont, and San Francisco, Calif., Seattle, Wash., and Houston, Tex., is headed by Thos. J. Bannan, and manufactures mechanical power transmission equipment and special machinery.

Degen-Fiege acquires Stephens-Adamson line

Degen-Fiege Co., Los Angeles, has been appointed Southern California distributor for complete line of equipment manufactured by standard products division of Stephens-Adamson Manufacturing Co., Aurora, Ill. Thus, Degen-Fiege will handle such S-A products as car pullers, hand and motorized winches, bulk car loaders and pliers, belt conveyor carriers and return rollers, swivel loaders, roller type holdbacks, and speed reducers.

Stephens-Adamson will continue to maintain factory stocks at Los Angeles and two factory sales engineers will be on hand to work with Degen-Fiege representatives in serving Southern California industrial firms.

Exide introduces battery lease plan

New lease-purchase plan has been introduced to buyers of electric lift trucks by Exide Industrial Division of Electric Storage Battery Co., with the aim of enabling users to pay for cost of electric power equipment as they use the trucks. This is done by permitting purchasers of electric lift trucks to lease batteries and chargers for periods up to five years, bringing initial outlay for equipment down within cost range of oil and fuel-powered industrial trucks. Battery and charger, which sometimes represent one third of initial cost, have customarily been bought separately from a battery manufacturer at the time the chassis is purchased from the electric truck manufacturer.

Huck Manufacturing rep moves to new quarters

Milton A. Miner and Assocs., exclusive West Coast representative for Huck Manufacturing Co. of Detroit, Mich., has moved into a new building at 1237 Arbor Vitae, in Inglewood (Los Angeles) containing 7,000 sq. ft. of floor space, to be used for sales staff, order department, warehousing, and tool maintenance departments. In an expansion of service to Western customers, Huck aircraft fasteners will now be stocked and shipped from Los Angeles to supply airframe industry and other commercial users. Over 750 different items will be stocked at the start, as well as over 700 tool parts for Huck gun models to facilitate repair and rental services. Headquarters of Huck Manufacturing are in Detroit, Mich.



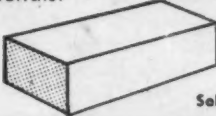
... the TWINS with the AMAZING PRICE TAGS!

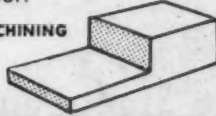
MORE PROOF THAT
COPPER FURNACE BRAZING
CAN CUT FABRICATING COSTS!

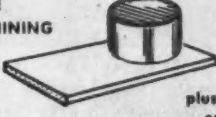
Actual Size

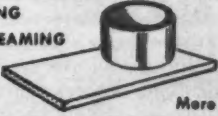
\$1.24


MACHINING

Materials:  Solid Bar Stock

Labor:  **MACHINING** 70% Metal Waste plus high labor

 **LATHE MACHINING** Extra labor cost plus expensive equipment

 **DRILLING and REAMING** More labor cost


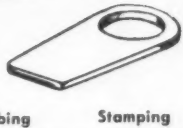
 **BLANK and DEBURR** Added labor cost



TOTAL COST \$1,240.00
... for 1,000 pieces

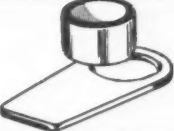
Identical TWIN parts... same appearance... same finish... same strength... BUT ONE COSTS 80% LESS...

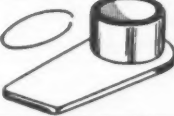
18 1/2¢


COPPER FURNACE BRAZING

Materials:  Tubing  Stamping

Labor:  Cut Off  Low labor cost

 **DEBURRING** by low cost Machine Tumbling

 **ASSEMBLY** by Press Fit Method

 **COPPER FURNACE BRAZING ***

TOTAL COST \$185.00
... for 1,000 pieces



* Can Be
Heat Treated
After Brazing

This example is not unique! A big savings like this is common in a switch to COPPER FURNACE BRAZING from other fabricating methods. Want more definite proof? Take any small part now used in your present production — call in your FABRIFORM man—ask him to quote prices (no obligation, of course)—then compare the big difference in cost. Your next order will be copper furnace brazed!! Write or phone TODAY!!

Specialists in Metal Joining Since 1929

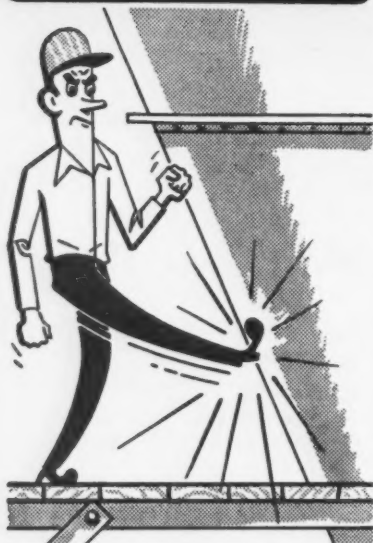
FABRIFORM METAL PRODUCTS

Division of George Getz Corporation

7720 MAIE AVE. LUDLOW 7-7131 LOS ANGELES, CALIF.

... for more details, circle No. 72 on Reader Service Postcard

BIN STUCK LATELY?



There's a better way to loosen up those bins... with a CLEVELAND AIR OR ELECTRIC VIBRATOR. It'll save on your shoe leather, your handling devices and your production time. Processors everywhere are using them to keep their materials moving swiftly and smoothly. There's a size and type for every requirement.



Free engineering service.

Write for our new literature.



7 Front St. • San Francisco 11, California
... for more details, circle No. 73



GREETING GUESTS for DeLaval Turbine Pacific Co. at its recent open house were Samuel P. Felix, vice president and general manager (left), and James P. Stewart and Hans G. Bauer, president and vice president respectively of the parent firm, DeLaval Steam Turbine Co., Trenton, N. J.

De Laval firms officially "open house"

Over 600 dealers, suppliers, and business associates of De Laval Turbine Pacific Co. and De Laval Pacific attended an open house at the newly constructed \$600,000 quarters of the firms in Millbrae, Calif., October 14.

Assisting Samuel P. Felix, vice president and general manager of De Laval Turbine Pacific, in the reception of visitors were James P. Stewart and Hans G. Bauer, president and vice president respectively of the parent firm, De Laval Steam Turbine Co. of Trenton, N. J.

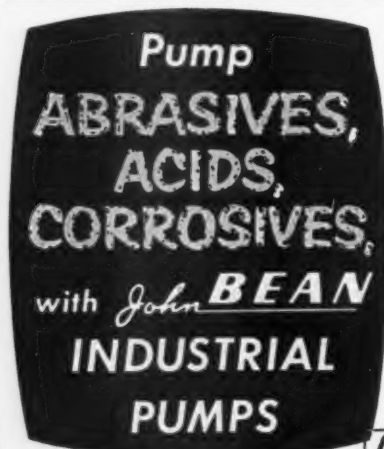
Earle C. Elvidge, vice president and general manager of De Laval Pacific Co., was joined in reception of the guests by C. B. Schmidt and W. A. McGill, president and vice president respectively of the parent firm, De Laval Separator Co., Poughkeepsie, N. Y.

Formerly located in separate quarters in San Francisco, the firms will retain their separate corporate identities although sharing the same quarters and facilities of the new plant in Millbrae.

Empire Steel begins Denver operations

Formally opened at the end of September, new plant of Empire Steel Corp. at 4305 E. 60th Ave. in Denver has begun steel warehousing and fabricating operations in a 12,000-sq. ft. initial plant building and 1,700-sq. ft. office building. Some specialty products new to the area will be fabricated. Facilities include an overhead crane, rail spur, and modern equipment.

Company, which will serve entire Rocky Mountain area, is headed by Alex Englander, president, and Mike Rubala, vice president. Among those present at the open house were representatives of United States Steel, Bethlehem Steel, Colorado Fuel and Iron Corp., Republic Steel, Youngstown Sheet and Metal, as well as prominent civic leaders.



WRITE for applications catalog.



John Bean Pumps are designed to handle gritty and corrosive materials, creosote, paint remover, drilling mud, bordeaux mixtures, varnish, paint and silicone resins. High-pressure does it! Diamond-tough Sapphite cylinders resist wear and stay glass-smooth!

- * Built for long-life and efficiency!
- * All parts accessible for easy maintenance!

FOOD MACHINERY and CHEMICAL CORPORATION JOHN BEAN DIVISION
Dept. W1, P. O. Box 145, San Jose 1, Calif.

... for more details, circle No. 74 on Reader Service Postcard

New rep for Automatic Switch in New Mexico

Joe E. Pearce and Associates, Albuquerque, N. Mex., has been appointed by the Automatic Switch Co., Orange, N. J., as authorized sales representative for electromagnetic controls sales in Arizona, New Mexico, and parts of West Texas. Shipment from stock and additional engineering services will be provided by firm's Los Angeles factory branch.

Allis-Chalmers names Idaho distributor firm

Stoddard Electric, Orofino, Ida., has been named a distributor for Allis-Chalmers motors in Latah, Clearwater, Nez Perce, Idaho, and Lewis counties of Idaho. Company is headed by H. T. Stoddard.

PIE shows new terminal

Open house at Pacific Intermountain Express' expanded terminal facility in Emeryville, Calif., on Oct. 20 gave visitors an opportunity to see a new 1,000-cart, 1,330-ft. endless chain Towveyor in operation. Other highlights of the \$800,000 expansion include two-way radio to local pick-up trucks, a pneumatic tube message system, teletype transmission of bills, and a fully equipped shop for preventive maintenance of trucks and trailers.

MEN OF THE TRADE IN THE NEWS . . .

M. E. Canfield Co.



P. M. Fletcher

handling. M. E. Canfield, in Los Angeles, is Southern California distributor of Lewis-Shepard line of electric industrial trucks and also handles hand trucks, power and gravity conveyors, wheels and casters, and other materials handling equipment.

Cold Metal Products Co. of Calif.

. . . names Ed S. Burdick to newly-created post of service engineer to sell and service the firm's line of specialty steels, with offices in Los Angeles. He was formerly with Crucible Steel's Los Angeles sales department for six years, and before that with Douglas Aircraft as steel buyer for ten years.

Rimat Gage Co.



C. R. Terpening

duction, gage room, and inspection techniques.

. . . appoints C. R. Terpening to newly created post of sales manager, with offices at firm's Pasadena headquarters. His former associations are Pratt and Whitney Division, Niles - Bement - Pond Co., and The Sheffield Corp., with experience primarily in field of air gaging and its application to production, gage room, and inspection techniques.

Houdaille-Hershey of Indiana, Inc.



J. D. Weatherford

. . . appoints J. D. Weatherford Western district sales manager in charge of sales in eleven Western states, with offices in Los Angeles. He moves from sales post in Detroit area. Company manufactures oil and coolant filters for diesel, hydraulic, metal-working, turbine, power generating, and other industrial equipment.



Moore's engineered reconditioning will add new efficiency to your roller mill production

Roller mills at top operating efficiency increase production, lower wage costs, and add product quality. Moore Dry Dock Company offers the West's finest roller mill reconditioning service for the following reasons:

EQUIPMENT

Four precision grinders, two with crowning attachments, for rolls from 1" to 25½" diameter and from 6" to 192" long, lathes, milling and welding machines, full facilities for chemical cleaning, and highly-accurate gauging instruments.

KNOW-HOW

Moore's engineers are thoroughly familiar with the optimum productivity built into every make roller mill and specifications, adjustments, etc. required to restore original efficiency to worn mills.

EXPERIENCE

Work for all the leading paint, ink, soap, chocolate, rubber, plastic, and feed processing companies in the West throughout fifty years of outstanding industrial service.

Have Moore's engineers survey your roller mill problems and recommend steps to restore your mill to top operating efficiency.



1905-1955 • Fifty Years Forward

Foot of Adeline St., Oakland 23, California Hlgate 4-3919

FORGING • HEAT TREATING • MACHINING • GRINDING • PLATE-SHEET-PIPE FABRICATION • STRUCTURAL STEEL FABRICATION AND ERECTION

. . . for more details, circle No. 75 on Reader Service Postcard

**DON'T
LOOK
NOW**

... but one of Milford's 5 plants or 20 offices is right nearby — ready to give you prompt service and swift deliveries on all your tubular rivet needs.

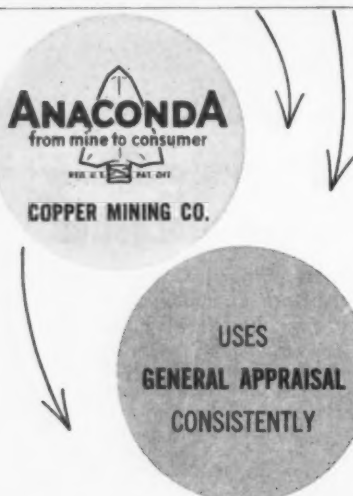
**THE
MILFORD
RIVET & MACHINE CO.**

Plants: Milford, Conn.; Norwalk, Calif.; Elyria, Ohio; Aurora, Ill.; Hatboro, Pa.

Offices: Atlanta, Chicago, Cleveland, Detroit, Fort Worth, Indianapolis, Newark, New York, Pittsburgh, Racine, St. Louis, St. Paul, San Francisco, Seattle; Norwalk, Calif.; Stratford, Conn.; Charlotte, N. C.; Seneca Falls, N. Y.; Jenkintown, Pa.; Westwood, Mass.

Headquarters for RIVETS
Tubular, split and special cold-formed;
and Rivet-setting Machines

... for more details, circle No. 76



Trust established through the years is recognized in the well-known trade-mark of Anaconda Copper Mining Co. The same kind of trust is displayed as this fine firm calls on General Appraisal Company repeatedly for authoritative property valuations. Since 1902 General Appraisal Company has been faithfully serving business and industry.

GENERAL APPRAISAL CO.	
SEATTLE SEneeca 6655	PORTLAND ATlantic 1-0095
SAN FRANCISCO SUitter 1-2056	LOS ANGELES TRinity 9631

... for more details, circle No. 77

Westinghouse Electric Corp.

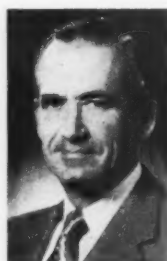
... advances *Carlyle W. Miller* to post of area sales manager for apparatus division in San Francisco. He has been with Westinghouse since 1927, most recently in position of sales manager of industrial electronics division in Baltimore, Md. He succeeds *G. B. Mason*, who has transferred to the company's Los Angeles office.

... names *Frederick C. Arnold* Pacific Coast welding sales manager in San Francisco. He comes to this assignment from St. Louis, where he has had this same post. He joined company in 1948.

Chicago Bridge & Iron Co.

... transfers two sales personnel to the West: *Robert S. Chamberlin*, who moves from general office in Chicago to San Francisco, and *Arthur G. Albertson*, who is assigned to Los Angeles.

Electric Corp. of California



S. M. Johns

... elects *Stanley M. Johns* vice president and director. From 1949 to 1954 he was Southern California manager of Westinghouse Electric Corp., and then moved to Indiana as national sales manager of Westinghouse industrial torque converter division. Electric Corp. of California has headquarters in Los Angeles.

A. C. Horn Co.

... names *Stanford R. Horn*, former sales manager, as general manager of company's Pacific Coast division. A. C. Horn Co., a division of Sun Chemical Corp., manufactures building construction and maintenance materials at plants in Los Angeles and San Francisco.

Resistoflex Corp.

... adds to its West Coast sales management staff *R. A. Paulbach*, who will make his headquarters at company's offices and plant in Burbank, Calif. He was formerly with Aeroquip Corp. Resistoflex Corp., Belleville, N. J., manufactures flexible hose assemblies and plastic materials for aircraft and other industries.

Hallidie Machinery Co.

... appoints *Paul Forsythe* vice president and general manager. He has been with Western Gear Corp.'s Seattle plant for past ten years, heading engineering and product promotion. Hallidie Machinery is an affiliated company in Seattle.

Kaiser Aluminum and Chemical Sales, Inc.

... transfers *J. E. Muller* from Spokane branch office to Los Angeles district office, where he will head sale of electrical conductor products. He was previously in planning department at Trentwood rolling mill.

General Petroleum Corp.

... advances *James F. Bly* to post of Arizona district sales manager, replacing *H. J. Byers*, who transfers to Seattle district as sales manager. Mr. Bly has been in charge

of market sales in southern area of Arizona since 1953, and now moves from Tucson to Phoenix.

Monarch Rubber Co.

... selects *Donald L. Roach* to head Western states district sales activities for company's complete line of solid industrial tires. He was formerly associated with E. I. du Pont de Nemours & Co. and with Perry and Whitelaw. His offices will be in Hayward, Calif.

Resin Industries, Inc.



D. L. Cochran

... picks *Douglas L. Cochran* as vice president in charge of sales. For nine years prior to joining this company, he was with Douglas Aircraft Co. in Santa Monica. Resin Industries, Santa Barbara, makes vinyl insulation sleeving and tubing for aircraft, electronics, and pharmaceutical industries.

United States Steel Corp.

... names *Elbert M. Foudray* manager of sales in charge of Portland, Ore., office of Columbia-Geneva Steel Division, an advancement from post of senior sales representative which he has held since 1952. He succeeds *M. B. Harrison*, who has been appointed district vice president for Inter-mountain sales district in Salt Lake City.

Consolidated Freightways

... names *Charles Clyde* to newly created vice presidency in sales department, with headquarters in Los Angeles. He has had post of southwestern division superintendent since 1944, and has been with company since 1931. In his new assignment he will represent general sales department in contacts, with customers in California, Nevada, Utah and Southern Idaho.

Sylvania Electric Products Inc.

... names *Leonard A. Komor* its district engineer for lighting in Northern California, with offices in Emeryville. He has been a pilot with U. S. Air Force and Pan American World Airways, and also served as field engineer with Factory Insurance Assoc.

... names *Burley T. Cram* as West Coast area manager of distribution service, with headquarters in Los Angeles. He has been district sales service manager at company's Los Angeles warehouse.

White Motor Co.

... transfers *Wyman L. Henry*, former manager of Kansas City branch, to Los Angeles, where he will head sales and service operations for White, Autocar, Sterling, and White-Freightliner. Mr. Henry joined White six years ago and served as sales manager of 3000 division at Cleveland home office. He replaces *L. A. Fleener*, who has resigned to join an automobile manufacturer.

Hubbard Co.

... admits two new partners to general partnership in Los Angeles: *Charles R. Sands*, who has been general manager of company since 1952, and *Stephen A. Barlow*, assistant general manager.

WESTERNERS AT WORK

United States Steel Corp. San Francisco

Max C. Scheble becomes assistant to general manager of operations for Columbia-Geneva division, moving to San Francisco from Provo, Utah, where he has been supervisor of raw materials planning since 1952. He joined Columbia-Geneva in 1937 as mine engineer at Columbia, Utah.



M. C. Scheble



Dr. H. G. Romig

Summers Gyroscope Co. Santa Monica, Calif.

Dr. Harry G. Romig is appointed staff engineer for this company. He was formerly with International Telemetering Corp., Los Angeles, in addition to consultant work, and before that with Hughes Aircraft Co., Culver City.

Alpha Engineering Corp. Santa Monica, Calif.

Harold Moss, former production manager of Lear, Inc., and Hoffman Radio, is chosen to head this company's newly formed electronics division.

Carrier Corp.

Monrovia and San Gabriel, Calif.

Ray A. Tritten is named assistant to general manager of West Coast divisions of company, which recently acquired Day & Night, Payne, and Monrovia Aviation divisions in Monrovia and Spectrol Electronics division, San Gabriel, from Affiliated Gas

Equipment, Inc. Mr. Tritten has been product manager for Carrier Weathermakers in main plant at Syracuse, N.Y.

McKinsey & Co. Los Angeles

H. R. Land, Jr., is elected manager of Los Angeles office of this management consultant firm. He succeeds Forrest D. Wallace, who has transferred to Chicago office. Mr. Land has been in charge of firm's Southern California operations in organization planning, marketing, and management controls.

Triangle Steel & Supply Los Angeles

Thomas A. Danahey is appointed manager of reinforcing department. He comes to the company from Fontana Steel, where he served as general manager.

Cal-Tronics Corp. Los Angeles

A. G. Kelly is appointed director of manufacturing. Raymond Floyd director of engineering, Dallas Franke director of research and development, and Richard E. Joy director of customer relations for this company, which designs and builds test equipment for radar fire control systems and guided missiles.

Northrop Aircraft, Inc. Hawthorne, Calif.

Ray D. Gardner is appointed project engineer for company's long-range interceptor program. He has been associated with all-weather interceptor and guided missile work at Northrop for past 13 years. A. S. Bowser, Jr., a veteran of 15 years aircraft experience, is named chief of operations services at Northrop's Palmdale airport installation.

Frank W. McNabb and Don L. Vivrette are appointed chief of quality control and manager of contract administration respectively at company's Anaheim plant. Mr. McNabb succeeds James J. Ward, who is now production manager at Anaheim. Mr. Vivrette fills a newly created post.

General Electric Richland, Wash.

Dr. F. W. Albaugh, former senior technical specialist at Hanford atomic plant, is named manager of advanced engineering section at Hanford. He replaces W. Kelly Woods, who is assigned to head GE's technical activities at Commonwealth Edison reactor project in Illinois.



Dr. F. W. Albaugh



K. S. Wright

Iron Fireman Manufacturing Co. Portland, Ore.

Kenneth S. Wright advances to position of plant manager and H. Tyrrell Lowry to operations manager at Portland plant manufacturing aircraft component parts. Mr. Wright has been operations manager since 1954. Mr. Lowry moves up from post of engineering supervisor.

R. K. Handley, who was superintendent of electronics division at Portland from 1948 to 1953, when he transferred to Cleveland as manager of two Iron Fireman plants there, is appointed director of manufacturing for all company plants in United States and Canada.

Autron Engineering, Inc. Los Angeles

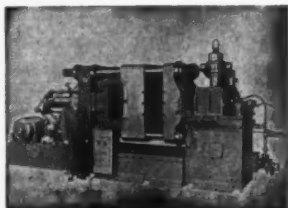
Del F. Kahan joins firm as vice president and chief engineer. He was last with United Control Corp., Seattle, as chief design engineer and has had 15 years of experience in communication, instrumentation, and automatic control fields.

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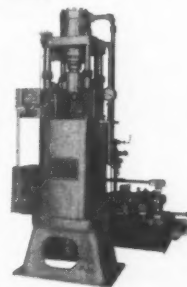
All machines are equipped with extra large oil reservoirs, oversize oil coolers and filters. They have a speed shot up to 1200 feet per minute and a range in locking pressures up to 1000 tons.



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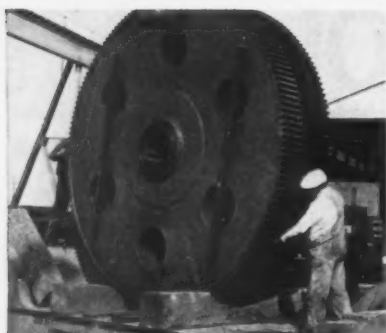
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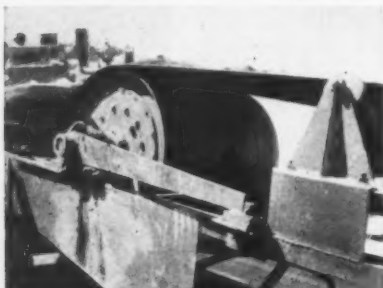


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For special equipment, designed and built to your order, consult YUBA.



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Southern Counties Gas Co. Los Angeles

Floyd R. Cramer is named to post of plant superintendent in company's Texas pipeline division, with responsibility for Blythe, Desert Center, and Cactus City compressor stations. He succeeds *Glenn V. Vail*, who resigned in order to join Pacific Northwest Pipeline Co.

Standard Oil Co. of California Richmond, Calif.

Carl W. Rehlfuss is appointed general manager of Richmond refinery, succeeding *R. K. Rowell*, who retires after ten years in that position and 38 years of service with company. Mr. Rehlfuss, with Standard since 1924, was previously assistant general manager, and is succeeded in that post by *M. F. Miller*. *T. M. Sheehy* moves up to Mr. Miller's former assignment as manager of operations.

Zenith Plastics Co. Gardena, Calif.

Robert W. Matlock is appointed chief engineer of Zenith Aircraft division of this company. He moves from post as division's technical representative, with earlier experience as well in aircraft engineering design from association with Boeing and Lockheed.

Westinghouse Electric Corp. Sunnyvale, Calif.

Frank N. McClure is named manager of Air Force compressor project at Sunnyvale plant, moving up from position of as-

sistant to manager. *Win Park*, who formerly held top post, is now in Pittsburgh for special training.

Romus Soucek is appointed manager of defense products for West Coast, with office in Los Angeles. He joined Westinghouse in 1946 as West Coast aviation representative and in 1948 was appointed sales manager of aviation gas turbine division, the post he is now leaving.

Cinema Engineering Co. Burbank, Calif.

Two new appointments are made to staff of Aerovox Division: *Frank Churchill* becomes department manager in product engineering, and *Dick Earnest* assumes newly created post of comptroller. Mr. Churchill has been field engineer at Long Beach with Schlumberger Surveying Corp. for past nine years. Mr. Earnest has had his own public accounting office.

Kaiser Engineers Oakland, Calif.

Lee J. Gillett is named procurement manager for this division of Henry J. Kaiser Co. He has been serving as purchasing agent for Kaiser Engineers at Hanford Plutonium Works in Washington. *C. H. Case* becomes a division manager, moving up from post of assistant division manager. He has been with Kaiser since 1948.

Consolidated Electrodynamics Corp. Pasadena, Calif.

Kenneth W. Patrick is named director of transducer division, replacing *Walter B. Claus*, who is now assigned to several special projects for manufacturing division. Mr. Patrick was formerly director of company's systems division. His successor is *Harry E. Burke, Jr.*, former assistant director.

Gregory S. Cadice is promoted to post of purchasing agent of transducer division. Former assistant purchasing agent, he joined Consolidated in 1952.

Stromberg-Carlson Division General Dynamics Corp. San Diego

Leonard Mautner is placed in charge of company's new West Coast operation, which includes Charactron project recently transferred out of Convair Division. Mr. Mautner, who is assistant vice president of Stromberg-Carlson, will have his headquarters in San Diego.

Triad Transformer Corp. Venice, Calif.

Henry Coffee is appointed transformer engineer in industrial division. He was formerly with Burton Equipment Co. and Gregory Electric Co.

Warm Springs Redwood Co. Willits, Calif.

Fred Christie is promoted to position of general manager, in addition to his duties as sales manager.

W. J. Voit Rubber Corp. Los Angeles

Frank J. Holmes is named factory manager for this company. He was last associated with Armstrong Tire and Rubber Co.

Foxboro Co. Los Angeles

C. E. Heegard joins company as industrial engineer at Los Angeles.



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Barnes & Reinecke Los Angeles and Denver

Two new sales representatives in the West are appointed by this firm: *L. W. Richie*, Los Angeles, for California, and *John Lindsay*, Denver, for Colorado. Company is a service organization in mechanical, automotive, production, and automation engineering fields.

California and Hawaiian Sugar Refining Corp. Crockett, Calif.

Arthur H. Herndon moves up to post of chief engineer at Crockett refinery. He has been with C&H since 1922 and in his new duties succeeds *George D. Hack*, retired.

Key Lab San Diego

Edwin L. Hutchins, test engineer, moves up to head quality control division. *Richard J. Revburn*, production engineer and chief of test, advances to top post in production engineering department.

Arthur D. Little San Francisco and Los Angeles

Dr. Benjamin S. Mesick, senior engineer on this Cambridge, Mass., research company's staff since September 1954, is selected to head newly opened Los Angeles office. He is a retired colonel in the Army Ordnance Corps, who in 1943 commanded Pomona Ordnance Base and from 1945 to 1949 was officer in charge of combined military liaison office of Jet Propulsion Laboratory of California Institute of Technology.

Accessory Products Corp. Whittier, Calif.

Leonard Griffith is named head of company's new high pressure pneumatic group. He was formerly division engineer in charge of hydraulics and pneumatics at General Controls Co.

Litton Industries Beverly Hills, Calif.

W. V. Phillips joins this company's Beverly Hills Electronic Equipment Division as head of industrial relations.

Marman Products Co., Inc. Los Angeles

George A. Seaver is appointed vice president and general manager of this subsidiary of Aeroquip Corp., Jackson, Mich. He was formerly general manager of Norcor Manufacturing Co.

Security Engineering Co. Whittier, Calif.

Hammond Helms is named manager of this company, one of the Dresser Industries. He was formerly with Cameron Iron Works, Houston, Tex.

Fibreboard Products Inc. San Francisco

B. D. White becomes purchasing agent, succeeding *H. L. Weber*, retired.

Colorado Fuel and Iron Corp. Pueblo, Colo.

R. Gordon Edgar advances to post of assistant superintendent of roll shops at Pueblo plant. He has been with CF&I since 1938 and has held title of assistant roll designer since February of this year.

Swift and Co. Boise, Ida.

Wallace G. Orwin is named to head Gem State Packing Co., recently acquired by Swift from Central Eureka Corp. of San Jose, Calif. He transfers from Chicago, where he has been assigned to president's office staff since 1954.

Kennecott Copper Corp. McGill, Nev.

Roger J. Howell is appointed safety director for Nevada Mines division, replacing *F. G. Woodruff*, now general superintendent of reduction plant at McGill. Mr. Howell joined company this year. His experience

includes service in Burma for Pierce Management, Inc., mining engineers.

Atomic Energy Commission Albuquerque, N. M.

Kenner F. Hertford becomes manager of Santa Fe Operations Office, succeeding *Donald J. Leehey*, who has resigned. Maj. Gen. Hertford, who retired from the Corps of Engineers to accept this appointment, has held assignments in Albuquerque with both the military and the AEC. At the time of his retirement he was chief of research and development in the Office of the Chief of Staff, Washington, D. C.

David W. Persons advances to post of

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director of facility planning at the Santa Fe Operations Office, succeeding *Harry L. Browne*. Mr. Persons joined the atomic energy program in 1949 at Los Alamos, and has been associated with development of Rocky Flats plant. Mr. Browne has resigned to join Thompson Products, Inc.

Consolidated Freightways Portland, Ore.

H. F. Huff is appointed to fill new position of director of personnel and training, moving up from assignment as director of training which he has held since April. He joined firm in 1950.

Structural Steel and Forge Co. Salt Lake City, Utah

Leo Davis, plant manager, moves up to post of general superintendent of company.

Salt Lake Refining Co. Salt Lake City, Utah

Austin B. Chinn is appointed superintendent of operations, succeeding *Lee P. Morris*, who has been appointed acting superintendent of new Vancouver B. C., refinery of Standard Oil Co. of British Columbia. Mr. Chinn has been with Salt Lake Refining since 1950, when he transferred from El Segundo, Calif., refinery of Standard Oil Co. of California, parent firm.

Vitro Corp. of America Salt Lake City, Utah

Richard C. Cole, plant manager at Salt Lake City, is named assistant general manager of company in addition to present assignment. He joined Vitro last year and for previous 20 years was with American Smelting & Refining Co., chiefly in Tacoma, Wash., Salt Lake City, and New York.

Pennsylvania Salt Manufacturing Co. of Washington Tacoma, Wash.

George H. McCord joins company as purchasing agent, succeeding *James M.*

McCullough, who has been appointed assistant sales manager, heavy chemicals. Mr. McCord was formerly purchasing agent for Columbia River Paper Mills and Oregon Pulp and Paper Group.

ASSOCIATIONS ELECT

American Ladder Institute:

President, *Paul Howard*, Howard Manufacturing Co., Kent, Wash.

American Society of Mechanical Engineers (Southern California section):

Chairman, *Robert M. Hatfield*, vice president, Combustion Engineering Co., Los Angeles; vice chairman, *F. J. Fontana*, chief engineer, Richfield Oil Corp., Los Angeles; secretary-treasurer, *Shuman Moore*, district manager, Foster Wheeler Corp., Los Angeles.

American Foundrymen's Society (Northern California chapter):

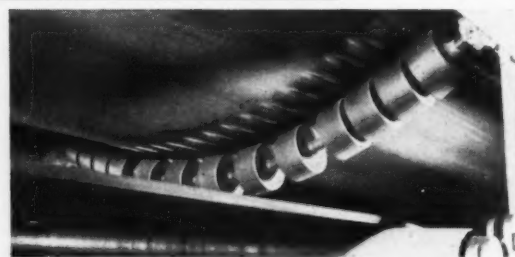


NEWLY ELECTED DIRECTORS of American Foundrymen's Society, Northern California chapter, are (l. to r.): *Hugh Prior*, superintendent, Superior Electro-Cast Foundry Co., South San Francisco; *David Sutcliffe*, sales, Brumley-Donaldson Co., Oakland; *Harold Wegner*, plant superintendent, Pacific Foundry Co., San Francisco; *Harold Lalley*, plant manager, Vulcan Foundry Co., Oakland.

(Advertisement)

NEW CONVEYOR BELT IDLER

Handles sticky, abrasive, dusty, or corrosive materials. Has only two bearings —up out of the dirt.

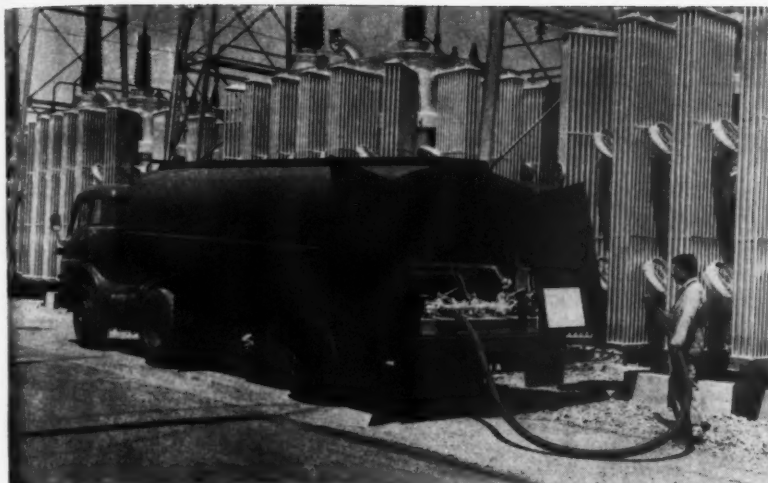


A 2-bearing, cable suspension idler that resists dust, abrasion, corrosion, and material buildup is proving itself superior for bulk handling in many industries.

Called the Limberoller, it has already given 10 times the service life of replaced steel idlers in handling abrasive foundry sands, coal, petroleum coke, potash, copper ores, copper mill tailings, iron ore, wet concrete, triple super phosphate, ammonium sulphate, and sticky fertilizers.

Pressure-molded neoprene or rubber discs on a flexible steel cable conform to load and cushion the belt, help keep belt aligned, and are self-cleaning. The two bearings are up out of the dirt zone; have had no design failures. Many firms have adopted Limberollers as standard for all belt conveyor operations. Details from Joy Mfg. Co., Oliver Building, Pittsburgh 22, Pa. Request Bulletin 12-17.

... for more details, circle No. 83 on Reader Service Postcard
WESTERN INDUSTRY — November 1955



MOBILE UNITS replace fixed oil systems

PACIFIC Gas and Electric Co. can dispense with fixed oil handling and filtering systems at two substations now that four specially designed tank trailers, one of which is shown above, are in use.

One set of two trailers and one tractor is located at the company's San Jose, Calif., division. The other is in

use at the Sacramento, Calif., division. With the extra tank trailer, one can be left on a job while the tractor delivers the other to another location.

Each trailer has a capacity of 3,500 gal. of oil, in two compartments, and a 12-in. filter press and transfer pump, both electrically driven and served from the station power bank.

MONOLITHIC REFRACTORIES HAVE THEIR PLACE IN FURNACE WORK

DFC Castable refractories fill the bill where you cannot use fire brick or where special shapes make EXPENSE a factor.

HI-CAST is supplied dry for mixing and pouring like portland concrete. Self-setting in a matter of hours, develops high cold-set strength in 12 hours. For boiler settings, furnaces, ovens, etc. Temperature ranges to 3000 degrees F.

CELLO-CAST is a companion material to HI-CAST. It features insulation value in place of high-heat strength and resistance to abuse. Has wide adaptability in replacing insulating brick and tile. Temperature ranges to 2200 degrees F.

PX-33 is a moldable fire brick, ready mixed for ramming. It is more durable than high heat duty fire brick or tile, and far more versatile for patching or for new work.

Use DFC refractories for every need. Write for data or see the yellow pages of your phone book under BRICK-FIRE.

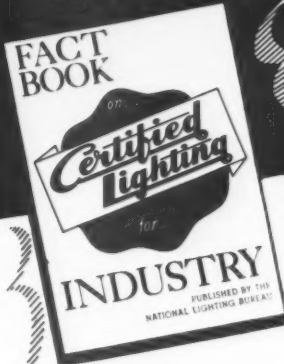


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November 1955 — WESTERN INDUSTRY

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Surveys show that correct plant lighting has cut production costs 15% to 25%.

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- ... by decreasing rejects and spoilage

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Bring your plant lighting up to national standards and watch **Certified Lighting** pay off in faster, better work and increased profits.

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PUBLIC PIGEON

Sometimes a fellow just doesn't know when he's well off. Or, as Socrates, or Aristotle or Pythagoras probably did not say "ignorance is sometimes bliss."



V. J. Fowcett

Seems like I've always been Public Pigeon No. 1 for every book or magazine salesman that ever came along, but my recent purchase of three Non-Fiction volumes is something that cannot be charged to low sales resistance. This purchase was made in the broad light of day, without coercion or crowding, without pushing or persuasion—There was no gimmick, no blond nor redhead book sales temptress working her way through Welding School—it was just a lusty impulse.

This impulse for more understanding of a very complex and profound subject has now inspired a book of my own, entitled, "How to be Happy Though Ignorant."

Titles of the three books do not sound too frightening, such as:

1. "Practical Gear Design," by Dudley.
2. "Gear Cutting Practice," by Calvin and Stanley.
3. "Gears for Small Mechanisms," by Davis of London.

These books describe all kinds of gears—herringbone gears, worm gears, spur gears, helical and spiral bevels, hypoid gears, lantern gears, involute and cycloidal gear teeth, etc. Lufkin makes most of these types.

However, what makes me break out with a rash every time I pry open a volume, are things like this: "The formula for the gear circular tooth thickness of any kind of bevel gear is

$$T + \frac{p}{2} \frac{p - (a_p - a_g) \tan \Phi}{\cos \psi} + \frac{k}{P_d}$$

Believe me friends, you need not memorize it, and I shall not try, but you may be sure that our Chief Engineer J. B. Hopper and his staff of gear experts will know what to do with it.

V. J. Fowcett

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BOOKS FOR INDUSTRY

POWER TRANSMISSION manual—how to do it

A working manual of data and background information covering all phases of the field of mechanical power transmission has been prepared by W. A. Williams, consulting engineer. It tells you how to solve your power transmission problems, how to cut hidden operating costs, and how to get the best performance from present and new equipment.

Covered briefly, but adequately, are the basic fundamentals of acceleration, power, and work governing the selection of proper equipment. Charts, tables, and photos illustrate each type of equipment in the field, which includes motors and engines, shafting, bearings, belt transmission, motor bases, variable speed transmissions, chain drives, gear drives, clutches, etc.

No attempt has been made in this 415-page manual to incorporate such detailed information about pieces of commercial equipment. Material has

been prepared in such a manner as to be usable as a reference, guide, or text book in the field. A heavy emphasis has been placed upon the economics of each drive under various operating conditions.

Mechanical Power Transmission Manual (Chilton Co., Chestnut and 56th St., Philadelphia 39, Pa. \$6)

INDUSTRIAL POWER— electrical systems covered

Sixteen specialists cover all major phases of electrical power system design with explanations of fundamentals and methods in this 971-page handbook. The wide range of subjects includes short circuit protection, methods of voltage regulation, allowable system voltage variations, effect of design problems on flexibility and economy, and costs of various power systems.

Effective methods are given for protection against system overvoltages due to lightning, switching surges, and restriking grounds. Also explained is how to modernize and expand existing power systems. Practical methods for applying modern power principles to commercial and office buildings are presented. Numerous case histories of modern industrial and commercial power system practices are given as examples of these methods.

Appendix of the handbook includes such data as conversion factors, equivalent values of electrical and heat units, device numbers and functions for switchgear, explanation of symbols used in power-system one-line diagrams, and other technical information.

Industrial Power Systems Handbook (McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. \$12.50)

STRAIN GAGES discussed

Proceedings of a symposium held November 1951 on characteristics and applications of resistance strain gages have been published in this 140-page bound volume.

Characteristics and Applications of Resistance Strain Gages, Nat. Bureau of Standards Circ. 528 (Government Printing Office, Washington 25, D. C., \$1.50)

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Electrical upkeep

... begins on page 39

the 15,000-kva. transformer and 2,000 on the larger transformers, with an interrupting rating of 250,000 kva.

Practical breaker care

Here is the procedure on circuit breaker maintenance as told by our electric power foreman:

"Our experience has been primarily with the drawout type air circuit breaker, and it is from this experience that these observations have been made.

"The job of these circuit breakers on electric arc furnace power applications is as severe as met anywhere. In the course of a 24-hour day in which 5 to 6 heats of steel are made, the circuit breaker may be opened and closed 70 to 90 times. Thus, in one day the breaker is operated as much as most circuit breakers are required to operate in months, or even years.

"At present, we are adhering to the following schedule: A routine change of breaker and inspection every 500 to 1,000 operations. A complete inspection, including disassembly of breaker contact moving parts and contacts, every 4,000 to 5,000 operations, or as determined necessary by routine inspection. At 15,000 operations, all contacts will have to be changed several times. At about 25,000 operations, the solenoid assembly is carefully inspected for wear. Although some parts, such as closing relay and interlock, require changing at 10,000 to 15,000 operation intervals, the solenoid closing assembly moving parts do not require replacement until 75,000 to 100,000 operations.

"Our procedure calls for at least one spare breaker so that one is in service and one out for inspection and repair or spare at all times. This allows repairs to be made while the furnace is still in operation and cuts down on delay time in case of breaker trouble. The maintenance man can just replace the breaker, leaving the repairs to men who have been trained in breaker maintenance work.

"A breaker maintenance procedure has been set up as a guide for the breaker maintenance specialist, along with the repair and replacement instructions from the manufacturer. A complete inspection might go as follows:

1. Counter reading is recorded and a close and trip test made on the test block at start of repairs.
2. The side and box barriers are removed.
3. Arc chutes are removed.

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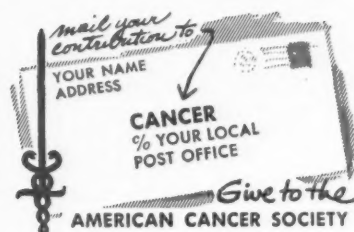
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4. A careful visual inspection is made of the contacts, movable and stationary, arcing and main.

5. Torque adjustment on the movable contact assembly is checked after disconnecting the operating arm.

6. The movable contact assembly hinge pin is removed and spring and hinge pin inspected. Spring is compared with a standard for signs of permanent failure.

7. Side insulation pieces are removed to allow access to and inspection of stationary arcing contacts and blowout coils and associated connections and insulation.

8. Bushing contact surface is inspected and lubricated, using silver contact lubricant.

9. Reassembly is carefully performed, making sure all bolts, nuts and cotter keys are secured and not broken. New cotter keys are used in reassembly.

10. All clearances are checked with breaker open.

11. Using a set of test lights, breaker contact clearance and wipe is measured and adjusted. A manual closing device is used to close the breaker slowly.

12. If contacts are changed, both stationary and movable must be changed.

13. Breaker operating mechanism is inspected and all control leads tightened.

14. The breaker is tested on the test block.

15. Bushings are meggered.

16. Arc chutes and box barriers are replaced and the breaker is again tested on the test block and a final counter reading recorded.

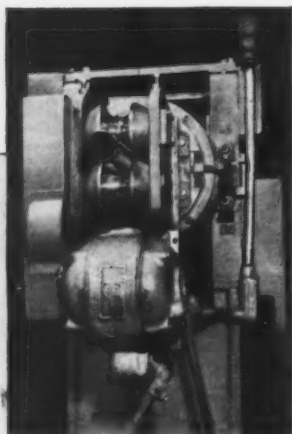
"A routine inspection consists of a visual inspection of all contacts, bolts

and nuts and cotter pins, test with test lights and clearance check, lubrication if required of contact surfaces, and test on test block. A routine inspection easily becomes a complete inspection if something out of normal is found.

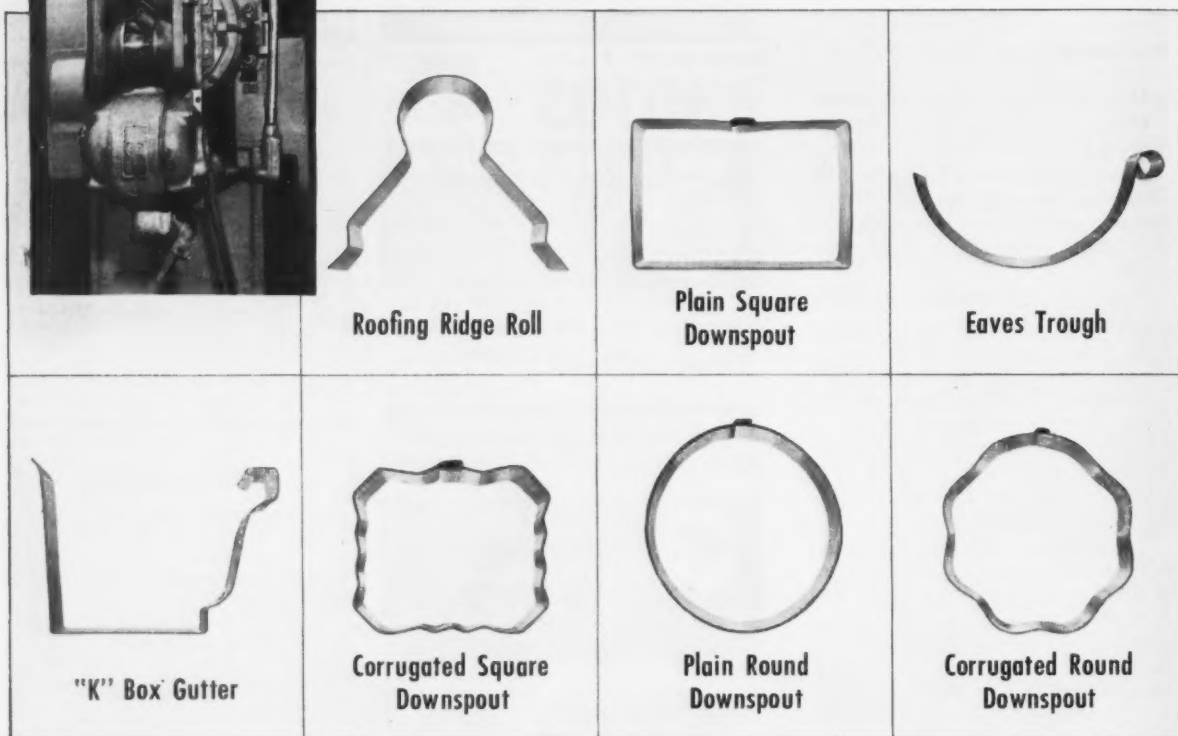
Bushing life increased

"Our experience has lead us to one interesting conclusion, among many. We had removed bushings from service due to wear on the hinge joint, which had little wear on the bushing contacts. In an attempt to get more life out of the bushing, we attempted the use of a floating silvered washer in a recess at this hinge joint. On the strength of our trial and suggestion the manufacturer made extensive tests using an alloy silver washer, and now has determined that the use of a replaceable floating washer gives maximum bushing wear and has incorporated this washer idea in its latest design modifications.

"We have found that heating of the hinge joint and failure of arcing contacts to transfer the arc are the chief sources of breaker failure. Complete and regular maintenance inspections and repairs have given us dependable circuit breaker operations with a minimum of delay."



Finished 2" downspout emerges from this Roll Forming Machine at a rate of 200 feet per minute. A battery of these machines take the footage material (28 gauge and heavier USS Galvanized Sheets) and automatically roll, seam and crimp it in a continuous, split-second operation.



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WESTERN INDUSTRY — November 1955

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THE West ON ITS WAY

NEW PLANTS, EXPANSIONS, NEW INDUSTRIES, PRODUCTION CONTRACTS,
DEVELOPMENT PROJECTS, UTILIZATION OF RESOURCES

HIGHLIGHTS . . . read details under state headings

Hughes Aircraft starts multi-million-dollar expansion in Tucson (p. 105)

Goodyear starts \$7,500,000 expansion in Los Angeles (p. 105)

Pittsburgh-Des Moines Steel buys Kyle organization (p. 105)

Pacific Coast Borax begins \$18,000,000 project at Boron, Calif. (p. 105)

San Francisco firm plans \$10,339,000 gas compressor plant (p. 105)

Western Gear plans 50% increase of Belmont, Calif., plant size (p. 108)

\$1,500,000 Los Angeles plant under way for California Spring (p. 108)

Kaiser Engineers to build \$15,000,000 reactor in Idaho (p. 109)

Anaconda Aluminum plans alumina plant in Spokane area (p. 111)

ARIZONA

HUGHES TO EXPAND—Multi-million-dollar expansion program is underway at Tucson plant of Hughes Aircraft Co., to increase production of guided missiles. Over 1,000 employees will reportedly be added to present 4,400 by the end of next year.

LAWN MOWER PLANT—New plant, owned by C. A. Mikesell, begins production of Mo-Trim power lawn mowers in Phoenix, with initial output of 10 mowers a day.

LOOKING AHEAD—New non-profit Municipal Industrial Development Corp. of Phoenix, backed by city's business and labor leaders, will buy two 40-acre areas near Sky Harbor Airport for future industrial development. One interested firm is reported to be Sperry-Rand Corp., which is seeking a location for an electronics plant which would provide some 3,000 new jobs. MIDC has also authorized a study by Stanford Research Institute on economic benefits of new industry as basis for providing material inducements to prospective manufacturers to locate in Phoenix area.

CALIFORNIA

GOODYEAR ADDITION—Goodyear Tire and Rubber Co. will add tire-curing facility to its Los Angeles plant

as the start of a \$7,500,000 expansion program which will increase production by more than 25%. Facility will require about one year to complete.

KYLE & CO.—Pittsburgh-Des Moines Steel Co. buys Kyle & Co., steel fabricating firm with plants in Fresno, Stockton, Sacramento, and El Monte, for purchase price in excess of \$1,000,000. Operations will be known as Kyle Division.

BORAX PROJECT—Pacific Coast Borax Co., division of Borax Consolidated Ltd., London, plans to build new concentrating and refining plants at Boron, Calif., and shift to open-pit mining, for greater production of boron compounds and borax, in a project estimated to cost \$18,000,000.

GAS COMPRESSOR PLANT—Pacific Lighting Gas Supply Co., San Francisco, plans to acquire and operate underground gas storage project in West Montebello area and to build gas compressor plant there, subject to approval of California Public Utilities Commission. Total cost of project is estimated at \$10,339,000. Company is a subsidiary of Pacific Lighting Corp.

NEW NAME—Consolidated Engineering Corp., Pasadena, will change firm name to Consolidated Electrodynamics Corp., in order to more appropriately describe scope of company's business and also to qualify to do business in two key eastern states.

NEW SITE FOR GYPSUM PLANT—Kaiser Gypsum Co., Inc., begins construction of new gypsum plant on 38-acre site in Antioch, about six miles east of Pittsburg site previously announced. First unit, to have annual capacity of 94,000,000 sq. ft. of board, will be in production this winter. Second unit, to have capacity of 180,000,000 sq. ft. of board and 20,000 tons of plaster, will be completed in August 1956. Pittsburg site has been retained for future development.

KAISER STEEL—Undeveloped limestone deposit in Southern California, near Lucerne Valley, is purchased for over \$1,000,000 by Kaiser Steel Corp. Deposit will be a source of metallurgical limestone for steel operations and also supply new cement plant to be built by Permanente Cement Co. in that location. Santa Fe Railroad will build 30-mi. spur from Cushenbury to main line at Hesperia, subject to Interstate Commerce Commission approval. Full-scale mining and shipping of limestone is slated to begin in about a year.

J. B. REA EXPANDS—A 40,000-sq. ft. building is slated for early construction next to present plant of J. B. Rea, Santa Monica, which will be used for added production, research, and development as well as computation service center.

185 NEW DIESELS—Southern Pacific Co. places orders for 185 new diesel locomotives, with total cost of about \$34,000,000. All units will be in operation by May 1956.

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WEST GROWS THE FASTEST—The West will have 16,626,000 more people in it in 1975 than in 1954, or 28% of all the population increase for the continental United States for the period, according to a newly-released study of population trends by Howard C. Nielsen, research economist for Stanford Research Institute. Its population then will be 39,021,000, compared with 22,495,000 in 1954.

Of all sections of the country, the West will continue to grow at the fastest rate, his study shows, the Mountain states gaining 66.3% and the Pacific states 75.9%.

California is projected as increasing from 12,554,000 in 1954 to 23,565,000 in 1975 (88%), Arizona from 993,000 to 2,327,000 (134%), and Nevada from 218,000 to 563,000 (158%). California is expected to have 60.4% of the West's population in 1975, as against 55.8% in 1954.

	Actual population 1954 (in thousands)	Estimated population 1975 (in thousands)	Percent increase
Arizona	993	2,327	134.3
California	12,554	23,565	87.7
Colorado	1,456	2,071	42.2
Idaho	615	780	26.8
Montana	628	767	22.1
Nevada	218	563	158.3
New Mexico	781	1,425	82.4
Oregon	1,639	2,344	43.0
Utah	757	1,231	62.6
Washington	2,540	3,530	39.0
Wyoming	312	418	34.0
Total West	22,495	39,021	73.5
Total Continental U.S.	161,999	220,794	36.3

C-Z BULLETINS—Crown Zellerbach Corp., San Francisco, is negotiating with Pabco Products Inc., San Francisco, on sale of C-Z 50% interest in Fibreboard Products Inc., to Pabco, the other owner.

Crown Zellerbach buys 42 acres of industrial property in San Leandro from Parr-Richmond Industrial Corp.

AEROLAB ACQUIRED—U. S. Hoffman Machinery Corp., New York, buys Aerolab Development Co., of Pasadena, which has worked on supersonic aircraft, guided missiles, and related equipment for Armed Forces. Company states products developed by Aerolab can be produced by Intercontinental Manufacturing Co., Dallas, Tex., subsidiary of Hoffman.

BUILDING COKING UNIT—Bankline Oil Co. awards contract for engineering and constructing 4,000-bbl.-per-day fluid coking unit at its Bakersfield refinery to Fluor Corp., Los Angeles. Process is licensed to Bankline by Esso Research and Engineering Co., New York. Construction will begin early in 1956 and will be completed that year.

NEW QUARTERS FOR STRATOS—New 20,000-sq. ft. building at Manhattan Beach will be completed next

February for Western branch of Stratos Division, Fairchild Engine and Airplane Corp., which has main plant in Bay Shore, Long Island, N. Y. Western branch will also use renovated 18,000-sq. ft. building and existing 20,000-sq. ft. building on new plant site. Branch will produce equipment formerly manufactured by Rhodes-Lewis Co., which was acquired by Fairchild from McCulloch Motors Corp.

CLOSE PLANT—American Motors, producer of Nash, Hudson, and Rambler cars, permanently closes El Segundo assembly plant, operated since 1949, in order to reduce costs. Company will concentrate car manufacturing in Milwaukee and Kenosha, Wis.

TARTAK SOLD—New York Transformer Co., Inc., Alpha, N. J., acquires Tartak Electronics, Inc., Burbank manufacturer of miniature and sub-miniature transformers, and will operate firm as a West Coast affiliate under new name of NYT Electronics, Inc.

WHITEMAN TO BUILD—Whiteman Manufacturing Co., construction equipment firm, will build \$500,000 plant in San Fernando Valley, near Los Angeles. Completion of first unit, providing 52,000 sq. ft., is scheduled for January 1956.

GROWING—Summers Gyroscope Co. builds 20,000-sq. ft. addition to its main plant in Santa Monica, increasing total company space under roof to about 65,000 sq. ft. Company will begin work shortly on another 100,000-sq. ft. facility which will permit consolidating five operations under one roof with total area of 165,000 sq. ft.

EITEL-McCULLOUGH EXPANDS—New 17,000-sq. ft. building for production of high power klystrons up to 20 ft. long will be added to main San Bruno plant of Eitel-McCullough, Inc., by early spring.

MORE SALT CAKE—American Potash and Chemical Corp. adds facilities to its Trona plant permitting 20% increase in production of natural sodium sulfate (salt cake).

FORM NEW COMPANY—Computer-Measurements Corp. is organized to operate Computer-Measurements Division of Detron Corp., recently acquired by RC Controls Corp., North Hollywood.

AIRCRAFT FIRMS MERGE—Reagan C. Stunkel acquires National Aircraft Corp., Metropolitan Airparts, and Western division of Florida Aviation, to be operated under firm name of National Aircraft Corp., which has headquarters at Burbank leased from Pacific Air motive Corp. Operations of purchased firms, including Mar Vista Electronics Co., acquired in August, will be reorganized under separate divisions performing aviation engineering and manufacturing, aircraft and servicing, and electronics manufacturing.

STILLMAN LEASES SPACE—Stillman Rubber Co., manufacturer of molded rubber products, leases 3,000-sq. ft. building in Culver City to house additional production operations and offices.

BUY HUFFORD—Hufford Machine Works Inc., El Segundo manufacturer of forming machines and specialized equipment for aircraft industry, is acquired by group of investors organized by William Husted of New York.

NEW ELECTRONICS PLANT—Electronic Specialty Co. moves into new plant in Los Angeles, which also houses four subsidiaries: Contract division, Shavex Co., Electromec, Inc., and Audio Pacific.

FIRE AT GENERAL PAINT—Fire destroys paint mill building and raw material warehouse of General Paint Corp. in San Francisco, with estimated loss of several hundred thousand dollars. Varnish plant, finished goods warehouse, and general offices were not damaged.

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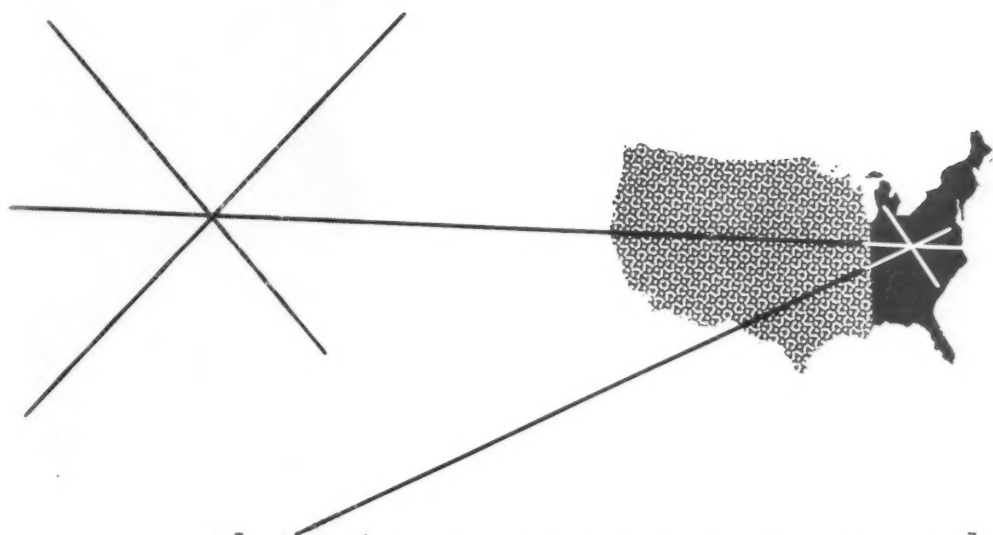
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WESTERN GEAR EXPANDS AT BELMONT—Architect's drawing of new addition to Belmont, Calif., works of Western Gear Corp., which will increase manufacturing area by about 50%. Plant produces special gear drives and transmissions for vehicles used by Armed Services, and addition, which is already under way, will provide space for manufacture of other special industrial machinery.



NEW SPRING-MANUFACTURING PLANT—California Spring Co. will occupy its new \$1,500,000 Los Angeles plant in early December, tripling production capacity for mechanical coil springs, wire forms, metal stampings, and small assemblies. General contractor and architect is John Alexander Co., Huntington Park.

SPAR-TAN BRANCH—Spar-Tan Engineering Co. of Los Angeles opens 20,000-sq. ft. branch plant in Oakland acquired from McQuain, Edwards & Tefft Co. of Oakland.

LENKURT LEASES SPACE—Lenkurt Electric Co., San Carlos manufacturer of telephone communications equipment, leases building now under construction in San Carlos. Space will be used for manufacturing operations and offices.

LONG-RANGE PROGRAM—San Diego Gas and Electric Co. will develop 15-acre site in southeastern part of city for new gas distribution center, which will require several years to construct.

MACHINE COMPANY MOVES—West Coast division of H & B American Machine Co., Inc., moves into new building in Culver City which doubles capacity for manufacture of structural parts for

military aircraft. Company headquarters are in Chicago.

PLANT IN HAWTHORNE—L. M. Engineering Co. starts work on new 36,000-sq. ft. plant and office building in Hawthorne, to cost \$600,000 and to be in operation about next February. Building will also house affiliate, L. M. Electronics, Inc.

DOUBLE SULFUR OUTPUT—Union Oil Co. of California is expanding Santa Maria refinery to raise capacity of sulfur recovery plant to 84 tons daily. Construction and equipment program will cost \$760,000.

PLOMB EXPANDS—Plomb Tool Co., Los Angeles, buys inventory, patents, tooling, and other machinery of Tubing Appliance Co., Inc., also Los Angeles, and will absorb purchased company's line of open-end ratchet wrenches into its Proto Tools division.

NEW QUARTERS UNDER WAY—AiResearch Aviation Service Co., division of Garrett Corp., is building new 115,200-sq. ft. facility on 25-acre site at Los Angeles International Airport, scheduled for completion next January. The \$600,000 project will double size of division's present quarters, which will no longer be used.

NEW PLANT IN SAN FERNANDO—Hycor Co., Inc., and Ircal, Inc., both subsidiaries of International Resistance Co., Philadelphia, are building \$1,000,000 plant for manufacture of electronic equipment in San Fernando Valley. Plant will employ about 300 persons.

PLASTIC FOAM PLANT—Dow Chemical Co. begins work on new plant in Torrance for manufacture of Styrofoam, multicellular plastic. Company, whose headquarters are in Midland, Mich., has other production facilities at this location.

CONTRACTS GO TO RYAN—Navy contract for \$5,000,000 covering production of automatic navigation systems is awarded Ryan Aeronautical Co., San Diego. Air Force contract for \$2,500,000 covers advanced development of electronics guidance systems for supersonic missiles. Other new contracts amounting to over \$5,000,000 are received for airframe parts and jet engine components, including Convair's supersonic bomber and North American's Sabrejet. Ryan is presently enlarging its electronics section with a new building for research and development, product design, and pilot line production.

METROPOLITAN ORDERS—A total of 14 new transports—twin engine Model 440 Metropolitans—have been ordered from Convair division of General Dynamics by three foreign airlines, with deliveries beginning early in 1956. Value of orders is \$11,250,000.

ADD AT DOUGLAS—Expansion program at Torrance facilities of Douglas Aircraft Co. will add new plastics building, extend tooling and maintenance buildings, and include maintenance storage shelter for shop and materials handling equipment.



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BIG BUSINESS — Lockheed Aircraft Corp., Burbank, receives letter contract from U. S. Air Force for production of jet fighters amounting in its entirety to over \$100,000,000. Two new Air Force contracts on jet trainers amount to \$25,000,000. Largest single transport order in aviation history, covering 40 Electras and 10 Super Constellations and amounting to \$125,000,000, is received from Eastern Air Lines. Largest order for cargo aircraft is placed by Flying Tiger Line, for \$20,000,000 covering 10 Super Constellation air freighters.

SUBCONTRACTS ON ELECTRA—Lockheed Aircraft Corp., Burbank, picks four aviation manufacturing firms to engineer and build complete sections of new Electra turboprop airliner: Menasco Manufacturing Co., Burbank, to produce landing gear; Northrop Aircraft, Inc., Hawthorne, to build tail section; Rohr Aircraft Corp., Chula Vista, to make up power packages installed on wing; and Temco Aircraft Corp., Dallas, Tex., to make wing flaps and ailerons.

ELECTRONICS PURCHASE—Electromation Co., Fort Worth, Tex., buys Kinevox, Inc., Burbank manufacturer of synchronous magnetic recording equipment, to operate as a division of Electromation.

SPECIALISTS—Western Carbide Corp. is formed in North Hollywood as a subsidiary of Superweld Corp., same city, to manufacture and market hard-facing materials.

LINDBERG ADDS SPACE—Lindberg Steel Treating Co., expands its Los Angeles plant by 50%, adding to shop and office facilities and laboratory.

COLORADO

ROCKY FLATS—Contract for new construction to expand Atomic Energy Commission's Rocky Flats plant near Denver is awarded Swinerton and Walberg Co., of San Francisco and Denver. Work involves an estimated total cost of \$13,500,000, to be performed on cost-plus-fixed-fee basis.

IDAHO

ENGINEERING TEST REACTOR—Atomic Energy Commission picks Kaiser Engineers division of Henry J. Kaiser Co., Oakland, Calif., to build engineering test reactor at Idaho Falls on cost-plus-fixed-fee contract. Completion is scheduled for spring of 1957. Overall cost is estimated at \$15,000,000, including design of reactor core by General Electric under subcontract to Kaiser.

NEW MEXICO

MINE REOPENS—After two years of inactivity due to reduced market demand, lead-zinc mine at Kearney operated by New Mexico Consolidated Mining Co., subsidiary of Peru Mining Co., resumes operation, with working force of about 100.

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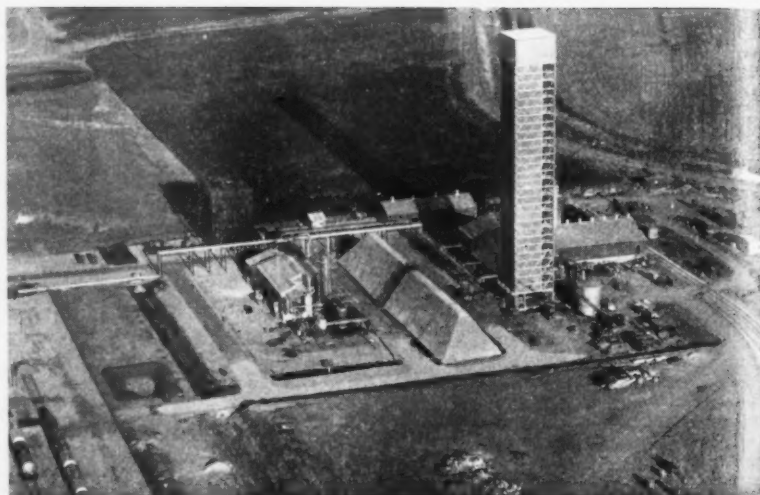
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ON STREAM—Brea Chemicals, Inc., begins operation of its ammonium nitrate unit at Brea, Calif., designed by Chemical and Industrial Corp., and engineered and erected by Macco Corp., at a total cost of over \$2,000,000. New plant produces ammonium nitrate in prilled form (free-flowing particles), with design capacity of 150 tons per 24 hours.

OREGON

CONSOLIDATING — Consolidated Freightways, Portland, enters agreement to buy Bice Truck Lines, Inc., Laurel, Mont., for total of \$414,000 in stock and cash, subject to approval of federal and state regulatory bodies.

SP BUILDS AT EUGENE—Southern Pacific Co. will spend almost \$5,750,000 in modernization of switching yard at Eugene, more than doubling trackage and car capacity. Completion will require two years.

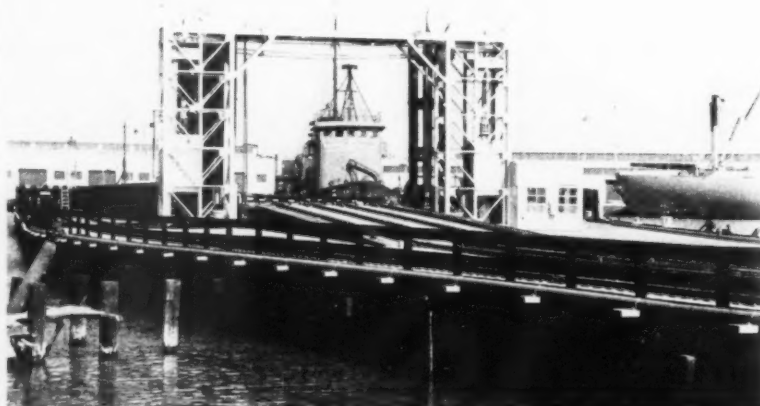
PLYWOOD BUY — Textron-American Inc., new textile organization with offices in Providence, R. I., plans to buy, for reported \$4,000,000, plant and property of Coquille Plywood, Inc., of Coquille.

ADD TO TERMINAL—Tide Water Associated Oil Co. will increase storage capacity by 25% with construction of two additional tanks and auxiliary facilities at its Portland bulk terminal.

UTAH

MORE SULFURIC ACID — Garfield Chemical and Manufacturing Co. will add 250-ton-a-day unit to its Garfield plant manufacturing sulfuric acid, at estimated cost of \$2,500,000. Company is joint affiliate of American Smelting and Refining Co. and Kennecott Copper Corp.

REFINERY EXPANDS—Salt Lake Refining Co. will begin work in December on an addition to its Salt Lake City petroleum refinery, which will increase flow of crude to stills by 15%.



NEW SANTA FE YARD OPENS—Santa Fe Railway puts in operation new 14-acre, 650-car freight yard and car-barge slip at China Basin, San Francisco. Here, a Santa Fe tugboat is shown in new slip. Freight cars are transported from San Francisco to main transcontinental rail line at Richmond by means of 260-ft. steel barges.

BACK IN OPERATION—W. M. Barnes Co., Los Angeles petroleum refining and engineering firm, agrees with receiver of Sure-Seal Corp. and affiliates, Salt Lake City, to operate wax plant which has been idle for several months. Barnes plans to add propane de-asphalter by February, to cost over \$150,000. Eventually, Barnes will buy plant for \$1,300,000.

CLEARING THE AIR—Columbia-Geneva Steel division of United States Steel Corp. completes installation of electrostatic precipitators and other equipment for elimination of air pollution at its Geneva works. Cost of program is unofficially estimated at over \$5,500,000.

WASHINGTON

ANACONDA ALUMINUM — Within next two years, Anaconda Aluminum Co., subsidiary of Anaconda Copper, proposes to build plant in Spokane area for production of alumina from domestic clays, according to company's testimony before Federal Power Commission, now considering importation of Canadian natural gas by Pacific Northwest Pipeline Corp.

KAISER ALUMINUM GROWS—Tacoma reduction plant of Kaiser Aluminum and Chemical Corp. is being expanded through addition of 18 new aluminum reduction cells, capable of producing 10,000,000 lb. of aluminum per year, raising plant's total annual capacity to 77,500,000 lb. Project will cost an estimated \$2,250,000. Additional reduction cells at Mead plant will raise capacity there by 2,600,000 lb.

BOARD FROM CEDAR WASTE—Columbia Veneer Co., which operates plywood plant at Kalama, leases site from Port of Everett for construction of new plant which will manufacture hardboard from waste cedar. Plant, which will reportedly cost over \$500,000 and employ between 60 and 100 men, will probably be in operation within a year.

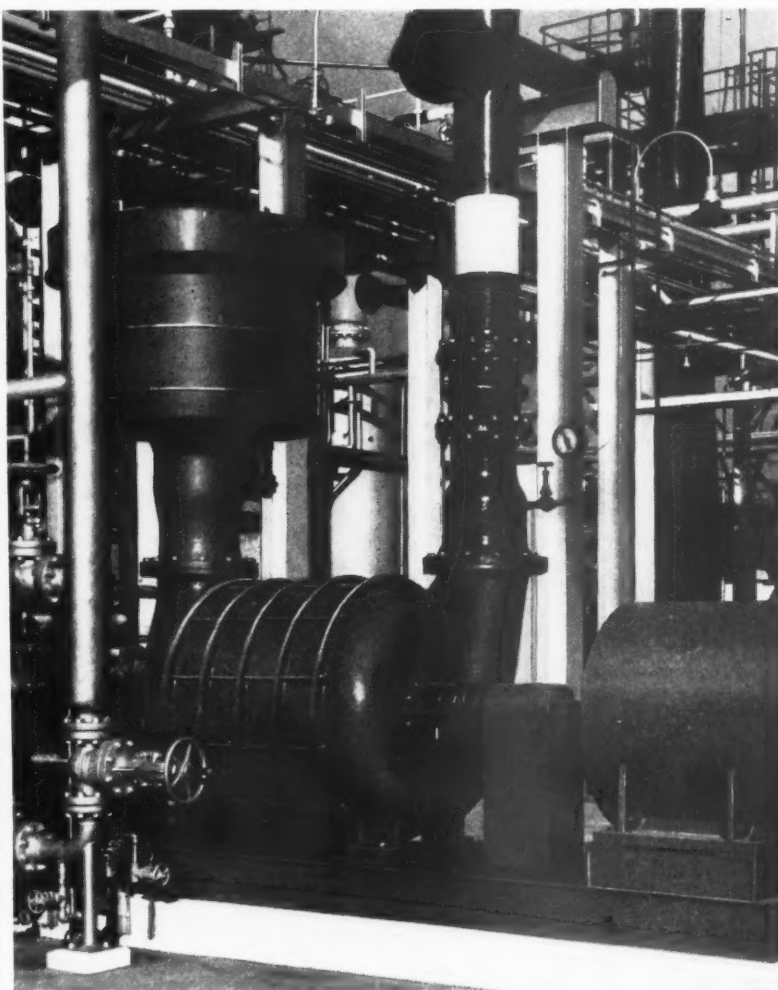
PICK PASCO—A \$20,000,000 chemical fertilizer plant will be built in Pasco area by Pacific Northwest Pipeline Corp. and Phillips Petroleum Co., operating through joint subsidiary, Phillips Pacific Chemical Co. Construction will start this year and plant will be in operation next year.

CANNING MILK—Whole fluid milk canning plant will open soon at Moses Lake operated by Morning Sun Dairy, Inc. Initial output will be 8,000 quart cans a day.

WYOMING

CHANGES AT LARAMIE — Great Western Aggregate, Inc., awards \$750,000 contract to Stearns-Roger Co. of Denver for conversion of part of Laramie alumina plant to production of light-weight aggregate. Facilities, scheduled for completion early next year, will use raw material from Laramie area. Activities still under consideration for rest of plant include production of phosphate mineral feed supplements and milling of uranium ore.

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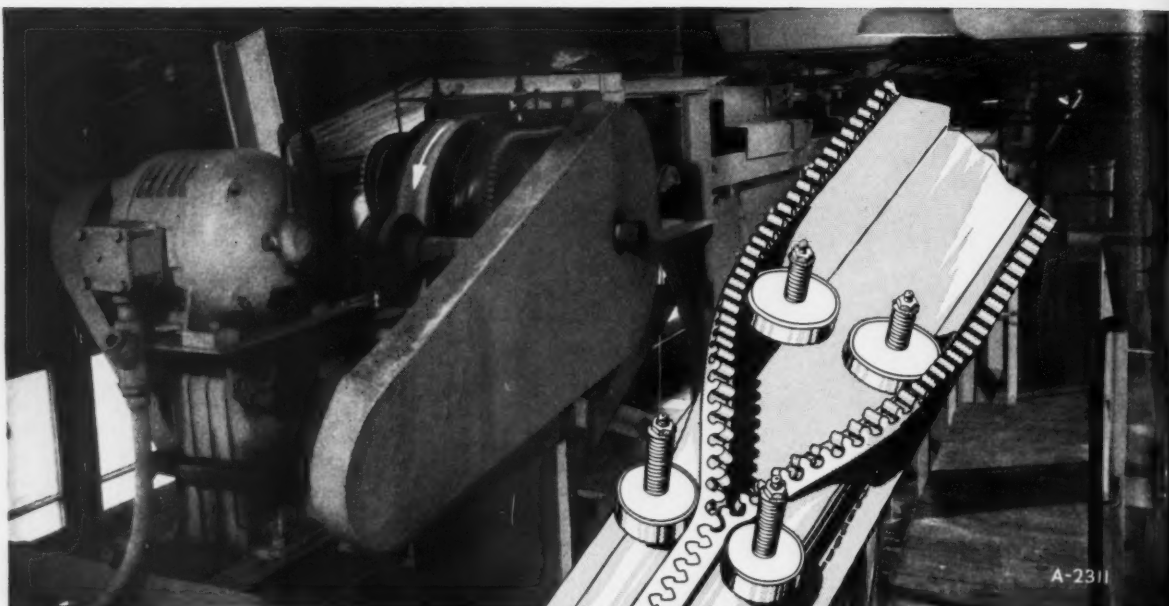
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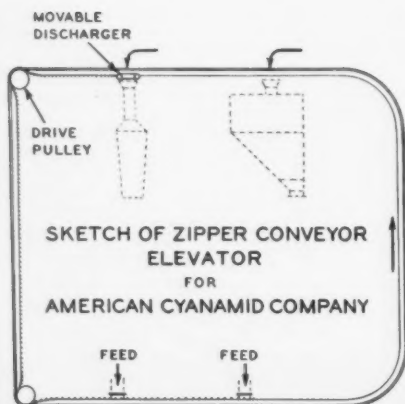
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